This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LELAND STANFORD JUNIOR UNIVERSITY
ORGANIZED 1891
STANFORD UNIVERSITY LIBRARIES

To James Horsburgh Jr.;
Through whose kind help I
was Enabled to prosecute
some of my researches on
this great Sahara of

THE WONDERS OF THE COLORADO DESERT

VOLUME ONE

California, which, however,
Ere long is destined to
become one of the Gardens
of the World.
With thankful appreciation
George Wharton James

By the Same Author

In and Around the Grand Canyon of the Colorado River in Arizona. Illustrated. 8vo. $2.50.

Indians of the Painted Desert Region. Illustrated. Crown 8vo. $2.00 *net.*

In and Out of the Old Missions of California. Illustrated. 8vo. $3.00 *net.*

The Story of Scraggles. Illustrated. 16mo. $1.00.

Indian Basketry. Third edition. 420 pages. Nearly 600 illustrations. $2.50 *net.*

In and Out of the Old Missions of New Mexico, Arizona, Texas, and Lower California. *(In preparation.)*

The Influence of the Mission Style in Modern Architecture. *(In preparation.)*

C. Eytel
1903.

The Wonders

of

[illegible]e Colorado Desert

[illegible]

[illegible]ers and its M[illegible]
Life [illegible] H[illegible]

[illegible]
[illegible] the C[illegible] R[illegible]

[illegible] GEORGE WHART[illegible]

[illegible]

[illegible]

CARL [illegible]

IN TWO V[illegible]

[illegible]

Boston,
Little, [illegible] Company
[illegible]

The Wonders

of

The Colorado Desert

(Southern California)

Its Rivers and its Mountains, its Canyons and its Springs, its Life and its History, Pictured and Described

Including an Account of a Recent Journey made down the Overflow of the Colorado River to the Mysterious Salton Sea

By GEORGE WHARTON JAMES

Author of "In and Around the Grand Canyon," "The Old Missions of California," etc.

With upwards of Three Hundred Pen-and-Ink Sketches from Nature, by

CARL EYTEL

IN TWO VOLUMES

Vol. I.

Boston
Little, Brown, and Company
1906

Copyright, 1906,
Edith E. Farnsworth.

All rights reserved

Published December, 1906

Typography by Griffith-Stillings Press, Boston, U.S.A.

IN THE DESERT

Silent Voices have spoken,
Peace has come,
Joy has flowed,
Courage has grown,
Health been regained.

To the SOURCE, the Maker of Deserts, with a thankful heart, I dedicate this book.

TO THE COLORADO DESERT

Thou brown, bare-breasted, voiceless mystery,
Hot Sphinx of nature, cactus-crowned, what hast thou done?
Unclothed and mute as when the groans of chaos turned
Thy naked, burning bosom to the sun.
The mountain silences have speech, the rivers sing;
Thou answerest never unto anything.
Pink-throated lizards pant in thy slim shade;
The horned toad runs rustling in the heat;
The shadowy, gray coyote, born afraid,
Steals to some brackish spring and laps, and prowls
Away, and howls, and howls, and howls, and howls,
Until the solitude is shaken with an added loneliness.
Thy sharp mescal shoots up a giant stalk,
Its century of yearning, to the sunburnt skies,
And drips rare honey from the lips
Of yellow waxen flowers, and dies.
Some lengthwise sun-dried shapes with feet and hands,
And thirsty mouths pressed on the sweltering sands,
Mark here and there a gruesome, graveless spot,
Where some one drank thy scorching hotness, and is not.
God must have made thee in his anger, and forgot.

— *Madge Morris Wagner.*

CONTENTS

Volume One

Chapter		Page
I.	A General View of the Desert	1
II.	The Physical History of the Desert	23
III.	Desert Surprises	33
IV.	The Rivers of the Desert	49
V.	The Mountains of the Desert	69
VI.	The Volcanoes of the Desert	81
VII.	Explorers and Pathfinders	87
VIII.	The Colorado River Ferry	117
IX.	Storms, Mirages, Desert Illusions, and Temperatures	123
X.	The Colors of the Desert	139
XI.	Some Wild Animals of the Desert	145
XII.	Some Desert Birds	157
XIII.	Reptiles and Insects of the Desert	169
XIV.	Plant Life on the Desert	207
XV.	The Indians of the Desert	233
XVI.	The Stage Line Across the Desert	253
XVII.	Water on the Desert	263

FULL-PAGE ILLUSTRATIONS

VOLUME ONE

Mirage in the Desert . . . . . *Frontispiece*
Reproduction in color of a painting by Carl Eytel.

Mr. Carl Eytel, the Desert Artist, Mr. Lea Van Anderson, and the Author's Faithful Pack-burros . . . . . *Page* xxxix

Mr. Eytel at work on the Desert . . . . . " xliii

In the Sand-dunes on the Colorado Desert . . . . . " 15

Colorado Desert from Andreas Canyon . . . . . " 25

Palms climbing the Ridges on the Colorado Desert . . . " 72

Palms in the Open, Colorado Desert . . . . . " 96

Tauquitch Canyon and San Jacinto Mountains near Palm Springs, Colorado Desert . . . . . " 120

Palms in the Canyon near Indio, Colorado Desert . . . " 140

Mesquite Trees on the Colorado Desert . . . . . " 208

The Ocatilla in Leaf . . . . . " 215

Specimens of Cactuses . . . . . " 222
Mamillaria Grahami, Mamillaria Wrightii, Mamillaria Pusilla var. Texana.

Specimens of Cactuses . . . . . " 224
Echinocactus Honzonthalonicus, Mamillaria Macromeris.

Specimens of Cactuses . . . . . " 231
Cereus Chloranthus, Mamillaria Tuberculosa, Cereus Cæspitosus.

Coahuilla Indian and Granary . . . . . " 244

In Thousand Palm Canyon, Colorado Desert . . . . . " 264

ILLUSTRATIONS IN THE TEXT

Volume One

Entrance to Murray Canyon	*Page*	xx
Indian Woman carrying Palm Leaves	"	xxiii
A "Well-dressed" Palm in Andreas Canyon	"	xxiv
Church at Palm Springs	"	xxvi
Aqueduct rounding one of the Spurs of the San Jacinto Range	"	xxviii
Volcanic Upthrust of San Jacinto Mountains	"	xxxi
Outlook from the Author's Home in Chino Canyon	"	xxxiii
The Author's Desert Home	"	xxxiv
Hot Spring where the Author bathes in Chino Canyon	"	xxxv
Saturnino, a Palm Springs Indian	"	xxxviii
Mountain-Sheep in their Haunts	"	xli
Banning. Mounts San Jacinto on the Left and San Gorgonio on the Right	"	2
Entrance to Tauquitch, or West Canyon	"	3
Near the Mouth of Chino Canyon	"	5
The Left Wall at Entrance to Tauquitch Canyon	"	6
The Ancient Beach Line near Torres	"	8
The Fierce Winds tear the Sand away from the Roots	"	11
In the Canyon of Five Hundred Palms	"	12
Sand-hills at Rimlon	"	14
Prickly Pear	"	16
Freaks of Erosion in the Yuha Country	"	17
Picacho Peak and Ocatilla	"	19
A Yuma Indian building his House	"	21
Arrow-heads	"	22
The San Gorgonio Pass	"	25
Salton Sea by Moonlight	"	31
Palms in the Foot-hills near Indio	"	34
A Lone Palm in Andreas Canyon	"	36

Yuma Woman	*Page*	40
The Smoke Tree (*Dalea spinosa*)	"	41
An Artesian Well on the Desert	"	43
Chuckwalla with Banded Tail	"	44
Tarantulas	"	44
Desert Tortoise, side view	"	45
Horned Toad (*Phrynosoma platyrhino*)	"	45
An Indian "Kish" with Granary on Roof	"	46
Idyllwild, in San Jacinto Mountains	"	48
The Author's Boat	"	51
Yuma Indian using Metate	"	56
Colorado River below Needles Bridge	"	57
The San Bernardino Mountains	"	66
A Glimpse of San Jacinto Peak	"	68
In the West Fork of Palm Canyon	"	70
The San Bernardino Mountains	"	73
A Side Gorge on San Jacinto Mountains	"	74
Bats' Caves near Durmid	"	75
Mount San Jacinto from Whitewater	"	78
Ravine near Mud Volcanoes	"	82
Approaching the Mud Volcanoes	"	83
The Seething Caldron of Boiling Mud and Quicksand	"	84
Built-up Cone of one of the Mud Volcanoes	"	85
Juan Segondo at Torres	"	88
Pounding Mesquite Beans	"	92
Padre Garcés at his Camp-fire	"	95
Rafael Amador's Ride	"	97
The Weary March of Kearney's Soldiers	"	99
The San Felipe Pass	"	105
A Desert-worn Animal	"	107
He was found dying, and near by his Mule, dead	"	110
The Way the Pioneers crossed the Desert	"	111
View of the Desert from the "Hidden Lake" Trail	"	116
Canyon on the Colorado River above Yuma	"	118
The Colorado River near Picacho	"	120
Railway Bridge and Steamer at Yuma	"	121
A Settler's Home on the Desert	"	123

Moving Sand-hills near Indian Well . . . . . *Page* 125
A Wind-storm in the Desert . . . . . " 126
Part of the Great Sand-hills . . . . . " 128
A Desert Graveyard . . . . . " 130
Mirage. Inverted Mountains in the Sky. . . . . " 132
A Desert Mirage . . . . . " 135
Pack-burros on the Desert . . . . . " 137
Group of Palms on the Desert . . . . . " 140
A Large Palm Group in Palm Canyon . . . . . " 142
A Coahuilla Basket of Beautiful Natural Colors . . . . " 143
On the Trail to San Gorgonio Mountain . . . . . " 144
Mountain Lion . . . . . " 145
"Just about to leap upon my Unconscious Friend" . . . " 146
Mountain Lion . . . . . " 147
Mountain Lion watching his Prey . . . . . " 148
Mountain Lion asleep . . . . . " 148
Desert Wildcat . . . . . " 149
American Deer . . . . . " 151
Don Coyote . . . . . " 152
A Dim, Shadowy Figure . . . . . " 153
A Mere Outline . . . . . " 154
Humming-bird and Nest . . . . . " 157
Eagle . . . . . " 158
Eagle eating Bird . . . . . " 159
The Elf-owl . . . . . " 160
Road-runner . . . . . " 160
Road-runner . . . . . " 161
Road-runner sunning himself . . . . . " 162
Blue Heron. . . . . " 163
Flying Herons . . . . . " 164
Brown Eagle . . . . . " 165
Condor . . . . . " 167
A Quiet and Cool Retreat in Andreas Canyon . . . . . " 168
A Desert Rattlesnake . . . . . " 169
Tiger Rattlesnake . . . . . " 171
A Traveling Rattlesnake . . . . . " 172
Sidewinder . . . . . " 174

Open Mouth of Sidewinder . . . . . *Page* 175
Diagram showing Rattlesnake's Fangs and Poison Glands " 177
Gila Monster . . . . . " 180
Chuckwalla . . . . . " 182
Chuckwalla . . . . . " 184
My Chuckwalla showing Fight . . . . . " 186
Burnett's Alligator Lizard . . . . . " 188
Small Desert Sand Lizard . . . . . " 189
The Banded Gekho Lizard . . . . . " 190
Horned Toad . . . . . " 191
Horned Toad . . . . . " 192
Desert Tortoise, top view . . . . . " 195
Desert Tortoise, bottom view . . . . . " 196
Scorpions . . . . . " 198
Centipede . . . . . " 199
Tarantulas . . . . . " 200
Tarantula . . . . . " 201
Tarantula Hawk . . . . . " 202
The *Dinapate wrightii*, the large Beetle found in the Desert Palms . . . . . " 203
The *Dinapate wrightii*, top view . . . . . " 205
Gila Monster . . . . . " 206
Wild Heliotrope . . . . . " 208
"Hen and Chickens" . . . . . " 209
Gum Plant . . . . . " 211
Desert Thistle Poppy . . . . . " 212
A Group of Old Mesquites . . . . . " 213
The Mesquite . . . . . " 214
Ocatilla, or the Devil's Claw . . . . . " 215
The Screw-bean Mesquite . . . . . " 216
False Tidytips . . . . . " 217
Sprigs of the Creosote Bush . . . . . " 218
Sunshine . . . . . " 219
Queen of the Night Cactus . . . . . " 220
Pentachæta aura . . . . . " 222
Tidytips . . . . . " 223
Blue-and-white Lupin . . . . . " 225

The Creosote Bush	*Page*	226
Blue Larkspur	"	227
Tarweed	"	229
Ehia	"	230
Evolution of Indian Dwellings	"	232
"Salesladiès"	"	234
Indian Dogs	"	234
Cocopah Indians, near Calexico	"	235
Potrero Indian Reservation at Banning	"	236
Granaries at Torres	"	236
Old Indian Well	"	237
Indian Boy on Horseback	"	238
A Coahuilla Basket	"	239
Indian Pony	"	240
Indian Horse	"	241
Indian Burro	"	242
Indian Granary	"	242
Brush Shelter	"	243
Evolution of Indian Dwellings	"	243
A Coahuilla Squaw	"	245
Indian Dogs	"	246
Indian Chicken House	"	247
Indian Horses	"	248
Corral at Martinez	"	250
Watering Place at Torres	"	251
Indian Baskets	"	252
An Early-day Stage-coach	"	254
An abandoned Light Stage for Swift Work	"	257
Later-day Stage-coach	"	259
Modern Visitors on the Desert	"	260
Old Stage-station at Vallecito	"	262
An Ancient Indian Well	"	264
Our Canteens	"	266
The Modern Artesian Well	"	268
Mexican hauling Water at Mexicali	"	270

Illustrations

MAPS

Plan of the Rio Colorado . . . . . *Page* xxvii
The Colorado Desert . . . . . *Facing page* 1
Mouth of the Colorado River . . . . . *Page* 53

INTRODUCTORY

HAT is a desert? Does any one know? The dictionary says it is "a deserted place or region; a waste; a wilderness; or, specifically, in geology, a region of considerable extent which is almost if not quite destitute of vegetation, and hence uninhabited, chiefly on account of an insufficient supply of rain." This, doubtless, is an accurate definition, yet all of the region described in these pages, though commonly included in the boundaries of the Colorado Desert, by no means comes under so rigid a description.

Indeed, in actual fact, there are no such regions known upon our earth; for the Great Sahara, the desert of all known deserts, which covers an area of 3,500,000 square miles, "though distinguished by aridity of climate, scarcity of running water, dryness of atmosphere, and a comparative paucity of vegetable and animal life, has rainfall, streamways, vegetation, and diversity of configuration." Furthermore, far from being uninhabited, it has a population of 2,500,000 people, or an average of seven-tenths of one person to the square mile.

Few people, even those who live within a few miles of the desert, have any right understanding of what it is. The popular conception is that a desert is all sand, — barren, desolate, unfruitful, shifting sands, where the heat is frightful and where nothing can live save horned toads, lizards, snakes, chuckwallas, and gila monsters. This is far from the truth. Read the following descriptions of the mountains. This is all desert region, except on the higher parts of the snow and tree clad San Jacinto and San Bernardino ranges. Read the account of the flowers seen between Mecca and the Brooklyn Mine in April, 1906.

Yet this is all desert. In a month after April the flowers were practically gone, and some years few flowers are to be seen.

In the year 1905 twenty-two inches of rain fell on one part of the Colorado Desert. Such is the desolation, the treelessness, the "soil-lessness" of the region that in a few hours after a rain, that would be productive of great good for weeks in a well-wooded and good-soiled country, scarcely a trace remains. The water sinks out of sight to be lost in the shattered rock strata, or even where there is sand there is no solid rock or clay sub-stratum to make water-pockets, so that the water rapidly seeps away. In places the slope of the country and the lack of soil

Entrance to Murray Canyon

and verdure allow the water to flow rapidly and uninterruptedly to the nearest "wash," from whence it dashes in increased volume, power, and speed to the nearest river or "sink," there to evaporate in the fierce heat of the sun.

To most people the Colorado Desert is not only a place devoid of interest, but absolutely to be shunned, feared, dreaded. If they must journey across it, they do so as hastily as possible in the fastest train, surrounded by all the luxuries modern travel can give; the blinds of the car drawn down if the journey is made by day, and with a sigh of relief and thankfulness if it is made by night.

In other words, civilization has taught us to dread a place that we should often seek. The Arabs speak of the desert as "The Garden of Allah," and he who has lived unworthily must

not desecrate it by treading in its holy precincts, unless he goes with penitence and prayer. In the desert the soul of man finds itself as nowhere else on earth. Here are solitude and God, both necessary, and the *only* necessaries to the full awakening of the human soul. The Arab has learned this. He has a keener spiritual sense than his material occidental brother. The footsteps of Allah are often heard in His desert garden, and the Arab goes to seek and follow them. He sits in the silence and listens for the voices that speak to his soul in the absolute stillness of the desert at the midnight hour. And what these voices declare he verily believes and obeys.

But in the material sense the Colorado Desert is a place of fascination and surprises. On every hand are strange, wonderful, and beautiful things,—things that are unknown to cities and to the unobservant anywhere. No hall of necromancers can equal the desert in its marvels and revelations. Wonder follows wonder in quick succession. And though constant association changes the surprise and amazement of first impressions to a steady and ever-growing affection, the wonder and marvel of it never grow dim.

Yet it is true that the desert is not for everybody. He who loves comfort and ease more than knowledge and power; who is afraid of hardship, solitude, heat, and general discomfort; who values the neatness of his appearance and cleanliness of his apparel more than filling himself with experiences strange and novel, and coming in contact with some of the most wonderful things of nature, had better remain away. The desert will flout him. Its winds will toss his well-combed locks astray and disarrange his dainty apparel; its storms will beat upon him and make him fear the deluge, as well as wash the starch out of his collar; its alkali and bitter waters will nauseate and disgust him, and its sands make his bed a place of unrest and mourning. Its lack of all native foods (except in a few favored localities) will offend his epicureanism, for to live on "condemned" foods is not agreeable to a pampered palate. Here are no smoking, lounging, or writing rooms. Out-of-doors has to answer for

every purpose, and many scores of pages have I had to write on my knee, or on a box, or even my suit case converted into an extemporized writing desk.

No! No! Pampered and feasted sons and daughters of cities, don't come to the desert. It is not for you. You have deliberately chosen your mode of life. It shuts you out from much of what is great and grand and educative and real; but having thus shut yourselves out, don't try to break down the barrier. If you do you will have a "hard time" and return home wearied, disgusted, and disgruntled. Far better read the desert through the eyes of those who, while appreciating what your life has to give to the hungry soul, prefer the larger, fuller, realer life of contact with uncontaminated nature.

The name, Colorado Desert, was first applied to this region by Professor W. P. Blake, when, as geologist of the expedition for determining the best railroad route from the Mississippi River to the Pacific Ocean, he made a comprehensive study of the desert. There is no denying that the use of the word "Colorado" has been a great source of misleading to those who jump to conclusions. Just as the "Grand Canyon of the Colorado" has been supposed (and still is) by thousands to be *located* in Colorado, so is the Colorado Desert supposed to occupy a portion of that great state of mineral wealth. For that reason, therefore, the use of the name is to be deplored, though Professor Blake is deserving of the thanks of the world of intelligent readers and students for giving this section of the great Sonoranian Desert a name which positively identifies it.

Dr. Walter T. Swingle, in his monograph on the Date Palm, advocates a change in the name. Here is his argument in full:

"In the United States the term 'desert' is applied to unirrigated or uncultivated arid regions, and as fast as such areas are reclaimed and put to profitable culture by means of irrigation, they cease to be called deserts and receive some other name. The appellation 'desert' is a hindrance to real-estate transactions, and is

felt to be unjust and opprobrious by those who live in the midst of flourishing fruit orchards and alfalfa fields. Doubtless the same change of name will take place in the case of the Colorado Desert, and indeed the misleading term 'Colorado Delta' has already been applied to the newly irrigated lands about Imperial and Calexico. The true delta of the Colorado River lies to the southward, where this stream enters the Gulf of California. The region in question might very appropriately be called the Salton Basin, inasmuch as it is a true basin, an area surrounded on all sides by mountains or higher lands and depressed far below sea-level in the center, where its most prominent topographical feature, Salton Lake or Salton Sink, is located. Throughout this bulletin Salton Basin is used instead of Colorado Desert to designate the lower parts of the lands sloping toward Salton Lake, a region limited on the north by the San Bernardino Mountains, on the west by the San Jacinto Mountains, and extending southward into Mexico to the line beyond which the delta lands slope toward the Gulf of California."

Indian woman carrying palm leaves

The difficulty with Dr. Swingle's suggestion is that it applies to a portion, only, of the region under consideration, and not to the whole. The San Bernardino Mountains and the detached ranges north, which lead to the Mohave Desert, are a part of the Colorado Desert, and they could not be included in the Salton Basin.

A very common and erroneous impression is that one can stand in the Colorado Desert, at say Palm Springs station, and see the range of mountains that separates the Colorado Desert from that of the Mohave. Such is not the case. There is not only no mountain range dividing them, but there is nothing else that

divides them. There is no authority yet who has divided them, or said where one begins and the other ends. There is no natural boundary whatever, and, therefore, should one be established, it would be as purely arbitrary as are the lines of meridian. For the purpose of this book I have established such an arbitrary boundary. Taking the San Gorgonio Pass as the northwest entrance to the Colorado Desert, and Mounts San Gorgonio and San Jacinto as its northwestern sentinels, I have placed the boundary line between San Bernardino and Riverside Counties as the northern limit, the Colorado River as the eastern limit, the boundary line between the United States and Mexico as the southern limit, and the San Jacinto range, with its southern extensions, going down into Mexico, as the western limit.

A "well-dressed" palm in Andreas Canyon

From these lines it will be seen that the Colorado Desert is confined within the two counties of San Diego and Riverside. That it extends beyond the Colorado River into Arizona, and also below the boundary line into Mexico, all are well aware, but I shall practically ignore these extensions in the following pages.

There being so much of vague mystery about the desert, and so few really knowing anything about it, one need not wonder

that many untrue and silly things have been circulated about it. For instance, not long ago a Los Angeles newspaper published a brief account of the "Palm Grove" in Palm Canyon, and with fine flourishes told that the palms, being dependent upon the heat from the live volcano "that stands near," will soon die. Here is the sage statement: "There is coming a time, however, when the grove will be no more. The heated conditions of the volcano which are necessary for the growth of the palm are gradually subsiding, though internal disturbances show that it has some fire, and recent earthquakes of but a few years past proclaim the powers of eruption not yet quenched, yet these are gradually becoming extinct. They are in fact scarce worthy of consideration; the time will not be long distant when this mountain will be perfectly quiet. The reduction of its temperature, which is necessary for perfect and gigantic Washingtonia, is the means of causing the death of this noble grove. The trees nourished by the volcano of San Jacinto are now dying with the mountain."

This whole quotation is folly, pure and simple, from beginning to end. San Jacinto shows no more volcanic heat than Wall Street in New York, and the idea that such heat, which burns and destroys, should be necessary for the preservation of the life of the palms is neither based upon observation nor reason.

As recently as 1882 a namesake of my own wrote an article in the *Popular Science Monthly*, which, while giving a fair general account of the desert, stated several "facts that are not so," as, for instance: "Men can only be induced to work on the railroad by offering them increased wages," — "Rain never falls on this desert in the natural manner," — and after describing certain gullies, — "These are caused by the rush of water from cloudbursts and waterspouts." Speaking of the sand-dunes and the effect of the shifting sands upon the railway tracks, "It has been found necessary to have a relay of men constantly on the ground, and every day they are engaged in clearing the track."

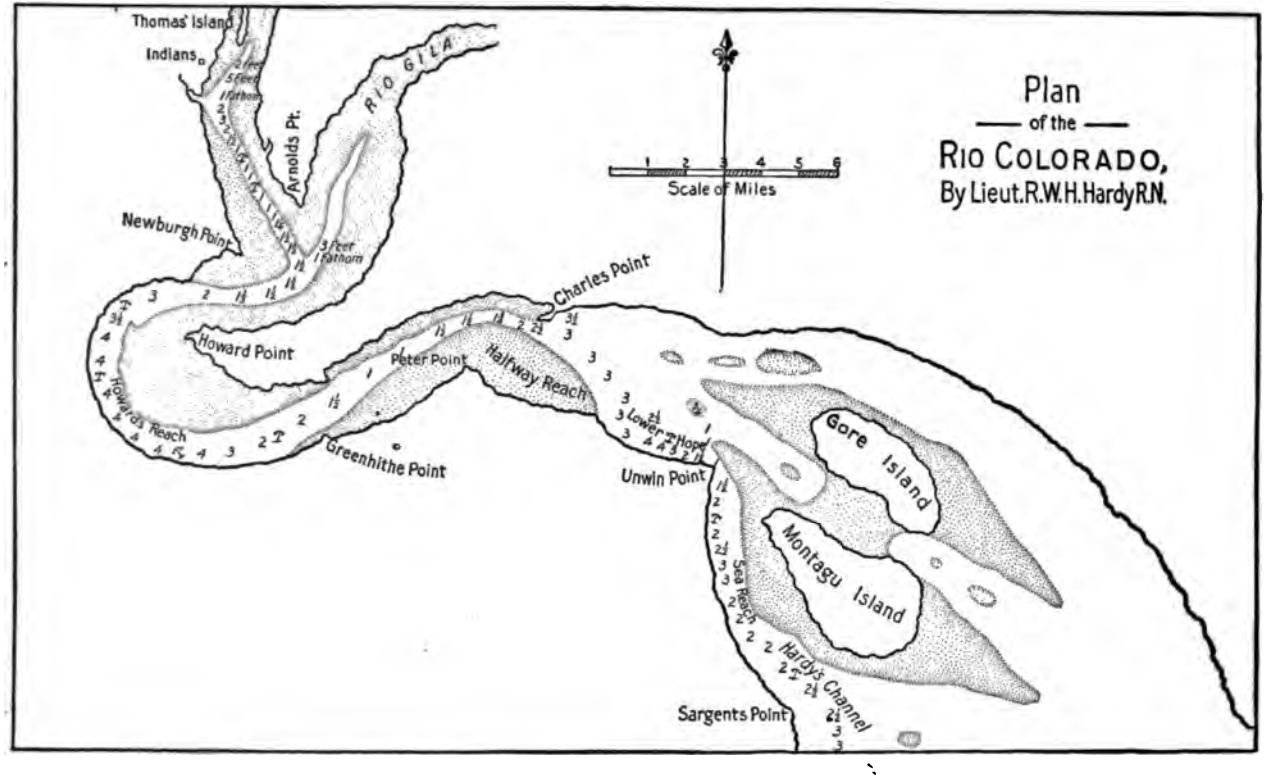
It has been the persistence of such erroneous statements that has so misled people in regard to the facts.

During the excitement caused by the overflow of the Colorado River into the Salton Sink, in 1890, readers of the newspapers saw many references to the river known as Hardy's Colorado. A vast amount of *mis*information has been generally disseminated about this river and how it came by its name.

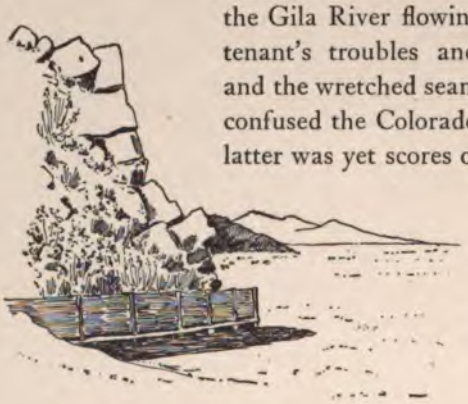
R. W. H. Hardy was a lieutenant in the Royal Navy of England. In 1825 he was engaged in the capacity of a Commissioner by the General Pearl and Coral Fishery Association of London to visit Mexico and report upon the pearl and coral fisheries of that country. In the discharge of that duty he made extensive travels in Mexico from 1825 to 1828, and in 1829 published in

Church at Palm Springs

London a full account of his experiences. He embarked at Guaymas and investigated the pearl fisheries of the Gulf of California. He was interested in exploring the head of the gulf, as he had been informed that an Italian priest had brought away, as the result of two months' work, $200,000 in native gold and pearls. The gold had been washed down by the Colorado River and was to be picked up by the bucketful. As he neared the head of the gulf, Lieutenant Hardy says he determined to "stand out more into the middle of the gulf, by which means I hoped, at daylight, to get sight of the Rio Colorado, into which I wished to enter for the purpose of procuring a supply of provisions from the Indians, and *of picking up gold dust at the same time.*" The poor lieutenant had a hard


Plan
of the
RIO COLORADO,
By Lieut. R.W.H. Hardy R.N.
Scale of Miles
1 2 3 4 5 6
Thomas' Island
Indians
RIO GILA
Arnolds Pt.
Newburgh Point
3 feet 1 fathom
Howard Point
Peter Point
Halfway Reach
Charles Point
Howard's Reach
Greenhithe Point
Unwin Point
Lower Head
Gore Island
Montagu Island
Sea Reach
Hardy's Channel
Sargents Point

time. His captain and crew were about useless, and in spite of all his endeavors he came near having a shipwreck, owing to the sandy shoals at the mouth of the river. These shoals bothered him exceedingly, as they have done every other navigator of the region. He could not realize that the vast amount of sandy silt being constantly brought down by the Colorado rendered charts of ten years or more ago useless. Finally he reached what he supposed was the Rio Colorado, and he describes its three mouths and also the troubles he had with the strong ebb and flow of the tides. He also gives a map, here reproduced, showing what he conceived to be the Colorado with the Gila River flowing into it. In the lieutenant's troubles and worries over the tide and the wretched seamanship of his sailors he confused the Colorado with the Gila, which latter was yet scores of miles above, and took for the Colorado a smaller and, as yet, unnamed stream coming in on the west. When, after the publication of his map, it was found what an error he had made, it became customary to refer to this unnamed river as *Hardy's Colorado*, a name it has retained to this day.



Aqueduct rounding one of the spurs of the San Jacinto range

It is scarcely necessary to add that the distinguished lieutenant did not get the gold he expected. He reports the sand to be "full of a glittering sort of tinsel, which shines beautifully when the sun is upon it." For twenty-six days he navigated the "Rio Colorado" and departed at length satisfied that he knew a great deal about the region. Such is fame, and such is the history of the origin of the name "Hardy's Colorado."

Perhaps I may be pardoned for here calling attention to a

matter that is somewhat personal. In one sense it is so, yet in another it is more than personal. It is in regard to pictures of the desert used by other authors to illustrate their works. The one picture that appears as a frontispiece to John C. Van Dyke's "The Desert" was made by my photographer, George L. Rose, under my direction, when he accompanied me to the Hopi villages. It is of that part of the Painted Desert overlooked by the road which ascends from the valley of the Little Colorado River between Volz's Crossing and his store at The Lakes.

In Burdick's "Mystic Mid Region" the photograph on page 3 was made under similar circumstances by my friend C. C. Pierce of Los Angeles, who accompanied me to photograph the Hopis and the Snake Dance at a later date. The picture was first used by me as the frontispiece to my "Indians of the Painted Desert Region." In this same book of Mr. Burdick's are sixteen other photographs of my own taking.

These facts serve to indicate that I have helped others make this fascinating region known to the world at large.

Some words on the desert have a meaning peculiarly their own. For instance, the word "inside" refers to the region away from the desert. "Where did you get these eggs?" you ask. "They came from inside!" is the reply. If you inquire where the miners buy their provisions they will tell you, "I don't often buy on the desert, I generally buy from inside," thereby meaning the towns of the inner country, as Colton, Riverside, San Bernardino, Los Angeles, etc.

These pages gather together the loose threads of twenty-five years of desert observations and experiences,—not all of them confined to the Colorado Desert. In making this book, however, I found such a wealth of material, much of it peculiar to the Colorado Desert, that I decided to confine myself, as far as geographical boundaries were concerned, to its comparatively limited area.

From many sources I have received help. Miners and prospectors, railway section-men, homesteaders, farmers, woodmen,

students, artists, naturalists, editors, county officials, and surveyors, as well as various writers, have given valuable suggestions, and to all of these I tender my hearty and cordial thanks.

Especially do I wish to record my gratitude to my venerable friend, Dr. Wellwood Murray of Palm Springs, the friend of Thomas Carlyle, Adam and Charles Black, the Chambers brothers and other literary notables of the Edinburgh of fifty years ago. From this center of culture he came to the desert, and for thirty years has studied it, worked over it, and sought to understand its mysteries and penetrate its secrets. Without reserve Dr. Murray has poured forth the wealth of his personal experiences and given of his valuable suggestions.

To Dr. Walter T. Swingle, Physiologist in charge of the Laboratory of Plant Life Industry in Washington, D.C., I am also indebted. Dr. Swingle is much interested in the Salton Basin, and it is to this interest we owe the establishment at Mecca of the government's experimental date farm.

The desert itself, however, has been my chief inspiration. Upon its northwestern edge I have a camp of my own. Within five and a half hours' ride from my Pasadena home, where library and pictures and piano and flowers and birds and congenial society all conspire to keep me (even were there no loved ones in the home itself), I have found this desert a resting place. Up in a canyon, on the northeastern slope of the great San Jacinto range, where seeping water makes a "cienega" and gives life to a good sized patch of grass; where a little extra pasturage can be found for my mules and burros; where some one, sometime, planted a fig tree, which has grown to rugged maturity and rich bearing; where there is a hot spring to bathe in, and a cold spring to drink from; sheltered on one side by one of the steepest, if not the steepest and highest wall in the world, and on the other with an outlook over illimitable wastes of desert land, here is where I love to come and rest, think, and write.

Solitary? No! Why should I be solitary, even though no other human beings are with me? Solitary in company with a majestic mountain that speaks a mystic tongue that I am slowly learning to comprehend; with a hot spring gurgling

Volcanic upthrust of San Jacinto Mountains

every moment of wonders in the earth's interior that I can only guess at; with a cold spring not a hundred yards away that tells of cool

mountain heights, where snow-banks lie all the year around, even though the hot blasts from the desert try to reach and destroy them; with friendly burros to come and seek for titbits from the table and act more human than most of the humans who have become over-civilized in cities; with the coyotes looking so wise and yet cowardly, so impertinently yet so sneakingly at you; with tiny lizards darting to and fro and perking their heads on one side so cunningly at you; with an occasional rattlesnake to watch, to follow, and to kill; with the mountain-sheep to peer down upon you from inaccessible mountain heights as if despising you for being so civilized as to be content to live in places where you can move about with ease; with the hoarse growl of the mountain lion occasionally in your ears, and the sniff, snuff, woof of the bear now and again as an accompaniment; with the murmur of the tiny stream flowing away from the springs and pathetically telling of its own speedy death in the sandy wastes below; with the quaint palms, standing like graceful sentinels making profound obeisance, near by,—can one be solitary with such companions as these, especially when, in addition, he has such stars and skies as the city dweller never sees; such an horizon as only the desert dweller knows; such sunrises and sunsets and morning and evening glows as only angels can understand the glory of; such silences; such voices out of the far away; such weirdness; such mystery; such winds; such storms; such calms? Ah, no! there is no solitude in such presences, for is not one with himself, with his ideals, with his dreams, with his ambitions, with the great ones of the past and the great ones of the future, with the achievements and life of the ages, and, better than all, with the source and origin of it all, with God?

No! No! I have felt more solitary and alone, more utterly desolate and forsaken, when walking through the streets of London and Paris, New York and Chicago, than I have ever felt in all my years of desert experiences.

I go to the desert with specific objects in view. I go for health, for inspiration, for work. The desert is God's great health-giving

laboratory. It is the manufactory of health where are to be found purest sunshine, purest air, purest soil. Disease flees away in such presences. With the freedom of the wild animals one sleeps on mother Earth's bosom and absolutely, literally, positively draws life and vigor from her maternal founts, — draws it in through every possible avenue; every pore of the skin drinking it in with eager avidity.

Come with me to my desert home. The house is only a rude lumber shack with one room, in which is a cook-stove, a table, a few utensils, and a couple of chairs, — the latter rude, home-

Outlook from the author's home in Chino Canyon

made affairs. "But," you ask, "don't you have a sleeping-room?" Certainly! Here it is! Did you ever see a more wonderful one? I have been in the palaces of Windsor and Buckingham and Sandringham and Versailles. I have slept in the palace bedrooms made by kings for their queens and mistresses, where costly decorations worth a great general's ransom give rich grace and elegance to the scene. Yet not all of them combined can compare in perfect beauty and profuse adornment with this of mine. And large? It is so large that these kingly palace bedrooms appear mean and insignificant beside it. It reaches for miles and miles to the north, even as far as the Aurora Borealis; to the south, to its pole; to the east, to the rising sun; to the west,

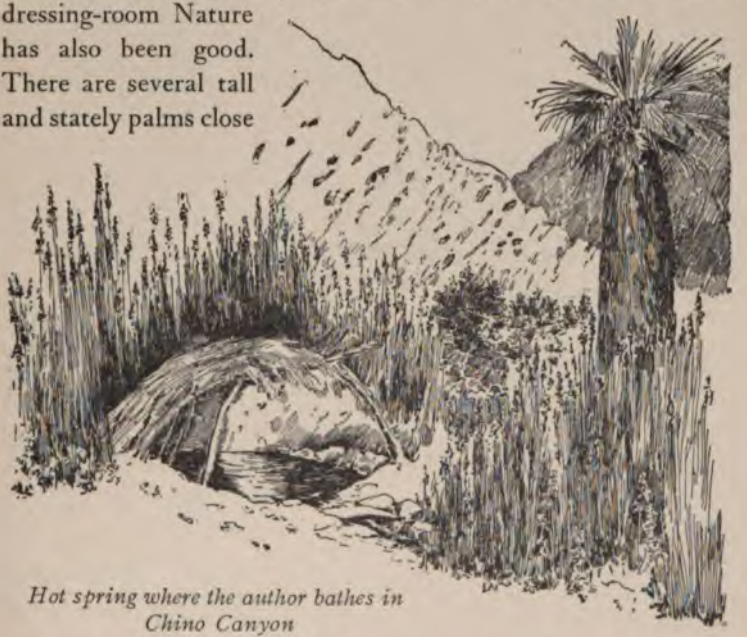
to where the sun bathes in the ocean of the sunset, and its ceiling is millions of miles high, decorated by the Master Artist himself with moons and planets and wandering stars set in a vault of such matchless blue as makes pale and faded the Tyrian blue of which Solomon was so proud. And its ventilation! How often have I longed for that system of ventilation when vainly tossing to and fro on comfortable beds in rooms equipped with the most elaborate and expensive of man's artificial ventilating apparatus. Here the air is always fresh and pure, bracing and stimulating, and at night-time, except in the heat of summer, can

The author's desert home

be described only by the one word, "delicious." It feels good to be alive in such air; every part of the body responds to the good feeling, the hands and arms are allowed to rest outside the bedclothes, the head and neck are exposed, the feet kick away the covers, and both before and after going to sleep one again and again lets the air flow in and caress the whole body. This is to take in life and energy in large quantities, this is to drink in vim and creative power from the fountain-head.

Then my morning, afternoon, and evening bath! There is nothing like it that I know of anywhere else in the world. We have read of Cleopatra's baths in asses' and camels' milk, and

various sybarites of all time have indulged in costly luxuries in the way of baths, but none of them ever equaled mine. The water is always on tap and always hot. It comes bubbling up out of the rocks and sand at the rate of several score gallons an hour. The rocks form a natural bath-tub which the Indians of the region have thoroughly cleaned out; then we have had it covered with beautiful palm-leaves, — great, flat-surfaced, natural thatch, —and now ten or fifteen people can bathe in it at one time. For a dressing-room Nature has also been good. There are several tall and stately palms close by, the leaves of which make as good flooring and carpeting as one desires out in the desert, and the palms are so large and outspreading and are so arranged that several dressing-rooms are provided, where, in perfect seclusion, one may don his (or her) bathing suit. But when I am alone I need no other suit than that provided at my birth. Now, into the bath! Gently at first, for the water is over 100° Fahrenheit, and that is hot, but the body soon becomes accustomed to it. Yes! accustomed to and delighted with it. You lie



Hot spring where the author bathes in Chino Canyon

down, and the water, charged with gases and bubbling up from below, strikes your body, and you feel as if you were having a bath in hot champagne. The pool is large enough to float in, and with the body partially in and partially out of the water the sensations are delicious. When you have had enough, out you come, and oh, what a surprise! The difference in the temperature of the air and that of the water seems as if it would chill you through. For as long a time as a plunge in and out of a swimming tank after you have taken a Turkish bath, you feel the cold shock of the air, then, gradually, there diffuses over the whole body, even while you are still drying yourself and exposed fully to the atmosphere, a delicious sensation of warmth and stimulus that can be neither described nor imagined. I never felt anything like it in any bath I have ever had, and I have been through complete courses in various hydropathic establishments of Europe and America as well as shared in the varied baths of our aborigines. The whole being seems exhilarated; you want to run and shout and work; your brain is as alert and active and anxious for work as is the body of a chamois, and when night comes you feel that that day at least has been full of physical and mental joy. You compare your lot with that of Bismarck, who, at eighty, wrote that in the whole of his life he had never known twenty-four hours' happiness. Poor fellow! Poor wretch! Here have you had almost twelve hours of pure, unadulterated happiness in one single day.

Chino Canyon,
Colorado Desert,
October, 1906.

CARL EYTEL

The Artist of the Colorado Desert

LONG ago in the Royal Library at Stuttgart, Germany, a quiet, studious, reflective boy, the son of a Lutheran minister of an adjacent village, might have been seen poring over Humboldt's vivid descriptions of California and the deserts he had to cross to reach it. The impressions then received remained deeply lodged in his inmost heart.

He had the artistic instinct, had this lad. He was especially fond of cattle, and two of the ambitions of his earliest years were, first, that he might see the great deserts of the West; and second, that he might paint them and his beloved cattle.

It was not strange, therefore, that when he left home he should aim as directly as he could for the region of his many dreams.

His first year and a half in the United States were spent in Kansas, where he worked on a cattle ranch, gaining that infinite knowledge of cattle which he knew he must attain for his art. Then he struck out for California, still keeping his ambitions in mind. He followed the plow, drove the hay-wagon, pitched hay, and did all the thousand and one little things that a handy man is set to do on a ranch, all the time longing for the day to come when he should be free to devote more time to the study of art. Secretly and with inward trepidation lest he be found out, for he was always shy and retiring, he spent his evenings, when possible, in sketching and trying to teach himself how to paint. Like Lincoln, reading by the light of his open fire, he spent many an hour, when he should have been in bed, grappling unaided with the first problems of drawing and painting.

For a year and a half he engaged himself to work in a slaughter-house, as he could find no other occupation where he could earn his livelihood and study cattle at the same time. Here he rode after them as a cowboy, — went on the roads, — assisted in cutting them out, branding and separating them, and many a bout has he had with the wild Texas steer when driving them to the slaughter.

A more congenial though less exciting occupation was found when he was engaged to drive the mule that pumps water for the cattle on the great Miller and Lux ranch near Bakersfield. For six months he followed this monotonous daily round, but his eyes were ever on the cattle. He studied them under every condition, and at every stage in their history from birth until they were driven to the cars or the slaughter-house. And when night-time came, with pen or brush, he would seek faithfully to reproduce on paper or canvas what had most impressed him during the day.

Saturnino, a Palm Springs Indian

As soon as he had saved up a little money he bought a stock of colors, brushes, canvases, pencils, drawing-paper, and provisions and made a bee-line for the desert. There he roamed and painted, sketched and studied, until food and funds gave out, when he went on to Arizona and there resumed his occupation. Every time his wages seemed large enough to justify another desert trip he resigned his employment and went back to his painting and rambling, and this continued for another two and a half years.

With this interesting territory, so new in all its life to the gently nurtured boy, he soon became fascinated. He loved its great plateaus, its forests, its vast plains, its marvelous canyons, its

Photo. by George Wharton James

MR. CARL EYTEL, THE DESERT ARTIST, MR. LEA VAN ANDERSON, AND THE AUTHOR'S FAITHFUL PACK-BURROS

glowing colors, its majestic mountains, and its singular plant life. The wildly picturesque life of the cowboy appealed to him, though he naturally revolted at the coarseness and excess too many of the fraternity indulged in. He began to write sketches to his home papers in Germany of this life as he found it, and illustrated his stories with drawings from his own pen and brush. Then he began to send articles and sketches regularly to the *New Yorker Staats Zeitung*, and he soon gained a host of friends by these simple and unpretentious, but real and truthful accounts of life on the frontier.

His own life, however, still remained strenuous and arduous. Many a time the battle seemed to be too hard, the difficulties to be overcome too great, for the poor and almost friendless youth. For, while he was friendly enough, his reserved habits and refusal to enter into the gay and extravagant carousals of his fellows did not tend to make him popular with them, and he was as shy about revealing his secret as a maiden is about telling of her first love, so that they could not have sympathy with a longing they might have admired had they known of its existence. Sometimes he felt inclined to give up his ambitions. The years were rolling along and he was accomplishing so little. Still he kept at it. Then doubt and despair tugged at his heart-strings until he was utterly despondent. But brighter days would come when all his resolutions and hopes would return. And so he has gone on until now, for fourteen years, he has lived much of the time on the desert. He has traversed its plains and climbed its mountains, breathed its parched atmosphere, mingled with its children, — the desert Indians, — studied its features, its plants, its birds, its reptiles, and its animals, and has become familiar with it in all its moods. In fact he has become a veritable "son of the desert," as much as any Bedouin that roams the Sinai peninsula, or a camel-rider who journeys from the Oued Souf to the Mediterranean.

From the heights of its mountains he looked into the great solitudes of the desert below and watched the changing colors revealed

in tawny sand, green oasis, or rocky slope on the opposite side. He saw such shadows as only God and the angels see; for man seldom thinks of such unsubstantial things as shadows, save and except such men as Eytel.

He studied the desert animals, the mountain lion, mountain-sheep, wildcat, coyote, chipmunk, and squirrel, and then watched the birds, the eagles, the hawks, the herons, the pelicans, the gulls, the mocking-birds, the doves, the vultures, and even the rare and seldom seen, almost extinct condor. He also learned the peculiarities and habits of the chaparral cock, or road-runner, that singular bird that is generally seen only when running away from human beings. With outspread wings and long rapid strides he rushes with great speed away from the stranger, stopping once in a while to give his tail a characteristic upward jerk, as much as to say, "I'll wave you a parting salute," then he dodges behind a bush or a sand-hill and is lost to sight. But Eytel followed and made friends with him, and was thus able to watch him at his toilet, when he preens his feathers, takes a sun or sand bath, etc.

Together Mr. Eytel and I have made trips where few white men have ever been and where our only trails were made by mountain-sheep, deer, or antelope.

Scores of the sketches in the following pages were made when he went alone, hundreds of miles at a time, over our American Sahara. Afoot, last midwinter, he made one trip of 400 miles,—thirty days of weary trails, of danger, hardship, hunger, thirst, solitude, and arduous toil. His itinerary was through a region largely devoid of vegetation or water. He had to provide for food, drink, and sleeping accommodation at the beginning of his journey. This meant the carrying of a pack which included provisions, water, and blankets. The water-holes and wells are from twenty to forty miles apart on the Colorado Desert, and a canteen of water is a heavy load to a walking man, especially when he has sandy or steep, rocky trails to go over.

In speaking of his experiences he is always modest and reserved. Yet they have been varied and exciting. Once he was seeking a

Mountain-sheep in their haunts

little Indian village for the purpose of making sketches of its rumored picturesqueness. He left the ranch at which he had been passing a few days, loaded with directions for finding the village—and with nothing else. He was assured that he could not miss the way and that he could get to the village that day, so he took neither food nor water, weapons nor matches.

There was a trail to follow which was to lead him straight to his destination, but the path forked, and his friends had forgotten to tell him of it and to instruct him as to which branch of the trail to follow. This led him down into a deep canyon, and the canyon tolled him on to finally bring him to an insurmountable wall. The greater part of the day was passed in getting out of this granite trap.

When once again he found himself upon the level plain he was thirsty, hungry, and nearly exhausted from climbing the steep walls of the canyon. He felt that the safest plan to pursue was to return to the ranch which he had that morning left, and start anew for the Indian village another day.

Near this ranch was a mountain of peculiar formation. He saw before him such a peak and mistook it for the one near the ranch. He started on a bee-line for this mountain. A couple of hours' brisk walking brought him to the rim of another canyon which blocked his way. The canyon extended as far as he could see in either direction, so he sought and found a point where he could descend into it, thinking to clamber up on the other side and pursue his way toward the mountain.

Night came on and he was obliged to wait for morning to prosecute his search for a place of exit. When daylight came he wandered up and down the canyon vainly seeking a point which he could scale. He was finally obliged to retrace his steps and climb out on the side he had entered. He then followed down the rim of the canyon, hoping to find a trail which would lead him to some habitation. About this time his light shoes gave out and he was forced to discard them. The way was rough and the stones cut his feet till they bled freely and he found it impossible to proceed in that manner. He then removed his undershirt, cut it in two pieces and bound them about his feet. He found it difficult to keep these makeshifts in place and his progress was exceedingly slow. The torture from hunger and thirst was becoming fearful, and to cap the climax of his misfortunes he lost his knife, the only implement he possessed.

That night he stretched himself out upon the plain to obtain such rest as he could and to await the light of another morning. Before sleep came to him a wild turkey came strutting near and passed within a dozen feet of him. This display of live meat was very tantalizing to the famishing man, but he was powerless to kill or capture the bird.

The fourth day of his wanderings he came to a deserted ranch-

Photo. by George Wharton James

MR. EYTEL AT WORK ON THE DESERT

house near which was a water-hole where he quenched his tormenting thirst. Then he approached the house and looked in at the open door. Half a dozen wild doves had taken refuge therein. Startled at the appearance of a human being they darted out, almost in his face. Eytel leaped in and closed the door in time to make one prisoner. After a lively chase he succeeded in cornering the bird and capturing it. It was but the work of a moment to wring its neck and strip it of its feathers, and he then proceeded to devour it raw. He declares it the best meal he ever ate.

While he was yet at this repast he heard the clatter of hoofs, and hurrying to the door he beheld one of the cowboys from the ranch he was seeking. He hailed him and learned that the ranch was but a few miles distant. The cowboy gave him his horse to return with, and in a short time he was safely housed among his friends. It took him two weeks to recover from the effects of his experience.

On another occasion he was taken for a noted desperado and horse thief and came near being hanged. He had been sketching in the mountains and was overtaken by night. He was just approaching a ranch-house in the valley and was about to enter the gateway and ask for food and lodging when a pack of dogs rushed out and with loud barking surrounded him. The dogs were followed by several men and boys, all armed, and he was commanded to "throw up his hands!" which he promptly did. A light was brought and he was closely questioned as to his business in that locality at that time of night. His explanations were received with scorn. In vain he showed his sketches. They were mere attempts to "throw dust into the eyes of the fools who could be thus easily deceived." Then one of the men recognized him as a noted desperado, and still another was sure that the horse he was riding belonged to a neighboring rancher. This was enough. To be a horse thief on the desert is to court certain death. A vigilance court was organized and a speedy trial held. Eytel's pleas were in vain. He was condemned to death. Then

some one suggested that the owner of the horse, as a matter of courtesy, should be invited to the hanging, and the execution was stayed while a messenger went for him. In due time he arrived, bringing with him another half-dozen men and boys to assist in the operations, but when everything was ready, and the culprit was brought forth, the astonished rancher exclaimed, "Why, this is not the man!" When the supposedly stolen horse was brought he likewise disclaimed all knowledge of it. This put a stop to the execution for that night. The "court" thought it would better suspend sentence until morning. Fortunately the sheriff of the county arrived the next day hot on the trail of the noted horse thief. In a moment he quenched all doubt as to Eytel being the man he wanted by calling the wiseacres "a set of very blank fools." The prisoner was therefore released with many and abject apologies and allowed to resume his rudely interrupted journey.

In regard to Mr. Eytel's work, it should be said that he is almost entirely self-taught. As such his work must be judged. The pictures of this book are his first pretentious attempt. I think they reveal genius as surely as they give proof that he has a persistence in the face of obstacles that would daunt most men. He knows the Colorado Desert as no other man knows it, and his sketches are faithful portrayals of objects he has seen and lived with. I could tell many stories of his persistence in obtaining the knowledge he sought, of days and nights of hungry, thirsty, weary following of trails to see a rare sight, or learn a new thing.

While Mr. Eytel (with the modesty that is one of the flowers of his character) would disclaim any right to be regarded as other than the artist of the book, I cannot do him the injustice to allow its readers to assume that I am the sole author of its literary contents. While I have done the actual writing, many pages of that which is written belong to Mr. Eytel, and I wish him fully to share in any praise which that portion of the book receives just as much as I wish him to be the sole recipient of all the praise for his beautiful sketches.

The Wonders of the Colorado Desert

CHAPTER I

A General View of the Desert

EFORE entering upon a detailed description of the desert in its various aspects it is well to obtain a broad and cursory survey of its general appearance. It must not be supposed that the Colorado Desert is a flat, level plain of barren sand. It is more diversified in feature than many of the Middle States.

Approached from its northwestern side over the San Gorgonio Pass the desert presents a far more barren, desolate, and forsaken appearance than when the traveler has been prepared by crossing the long sandy stretches of Western Texas and Arizona. The contrasts are very marked between the alkali flats, sand areas, and sand mountains, colorless desert verdure, volcanic peaks, unclothed foot-hills, and mountains that seem to be absolutely barren, and the orange and lemon groves, peach and apricot orchards, stock ranches, alfalfa farms, and bright, cultivated, flower-bedecked areas of Southern California.

The ascent from Colton is easy and gradual for about thirty miles until the summit is reached. Here let Clarence King tell us what is to be seen:

"There are but few points in America where such extremes of physical condition meet. What contrasts, what opposing senti-

ments, the two views awakened! Spread out below us lay the desert, stark and glaring, its rigid hill chains lying in disordered grouping, in attitudes of the dead. The bare hills are cut out with sharp gorges, and over their stone skeletons scanty earth clings in folds, like shrunken flesh; they are emaciated corpses of once noble ranges now lifeless, outstretched as in a long sleep. Ghastly colors define them from the ashen plain in which their feet are buried. Far in the south were a procession of whirlwind columns slowly moving across the desert in spectral dimness. A white light beat down, dispelling the last trace of shadow, and above hung the shield of hard, pitiless sky.

"Sinking to the west from our feet the gentle golden-green *glacis* sloped away, flanked by rolling hills covered with a fresh, vernal carpet of grass, and relieved by scattered groves of dark

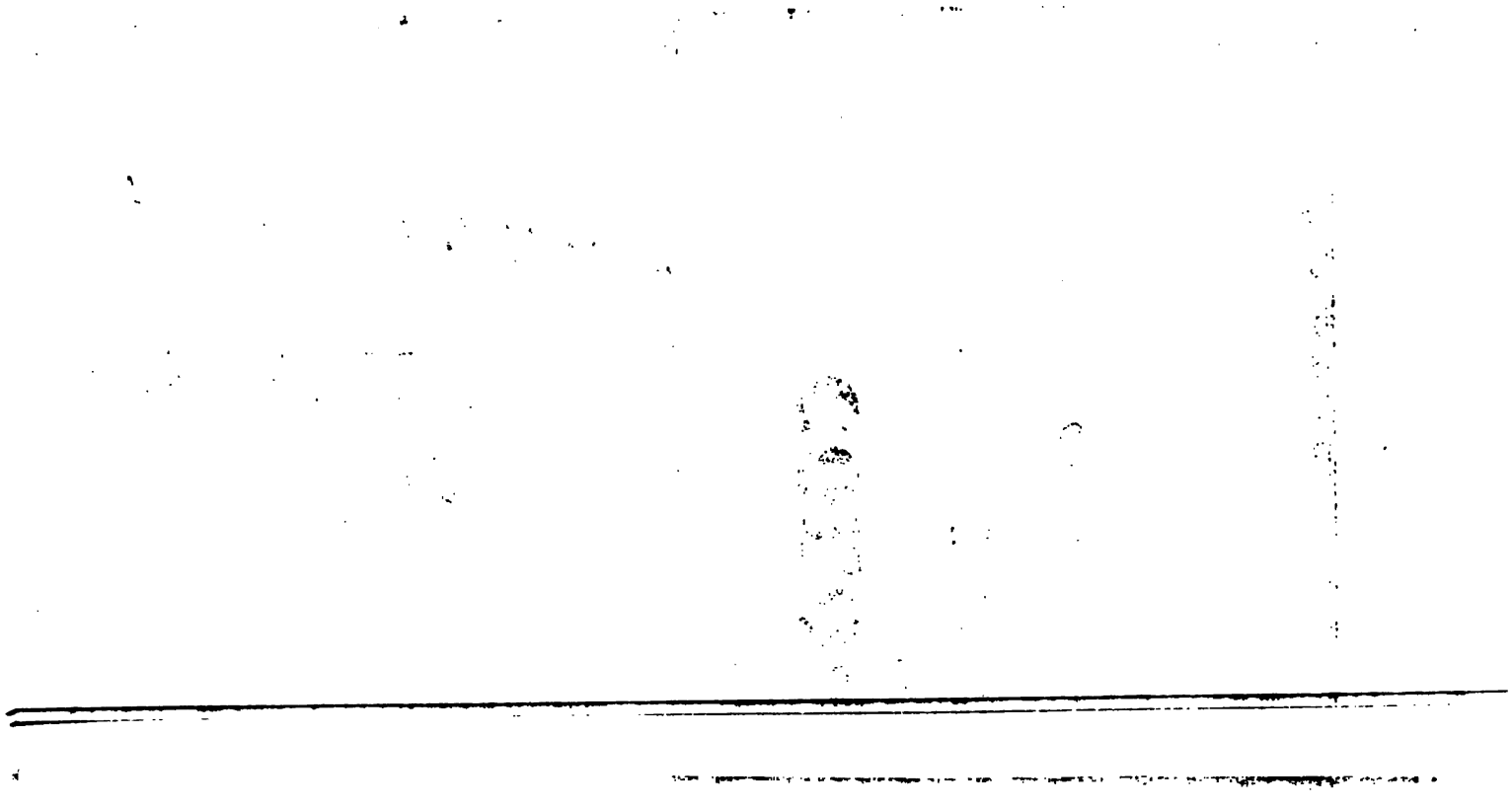
Banning

Mounts San Jacinto on the right and San Gorgonio on the left

oak trees. Upon the distant valley were checkered fields of grass and grain just tinged with the first ripening yellow. The bounding coast ranges lay in the cool shadow of a bank of mist which drifted in from the Pacific, covering their heights. Flocks of bright clouds floated across the sky, whose blue was palpitating with light, and seemed to rise with infinite perspective. Tranquillity, abundance, the slow, beautiful unfolding of plant life, dark, shadowed spots to rest our tired eyes upon, the shade of giant oaks to lie down under while listening to brooks, contralto larks, and the soft, distant lowing of cattle."

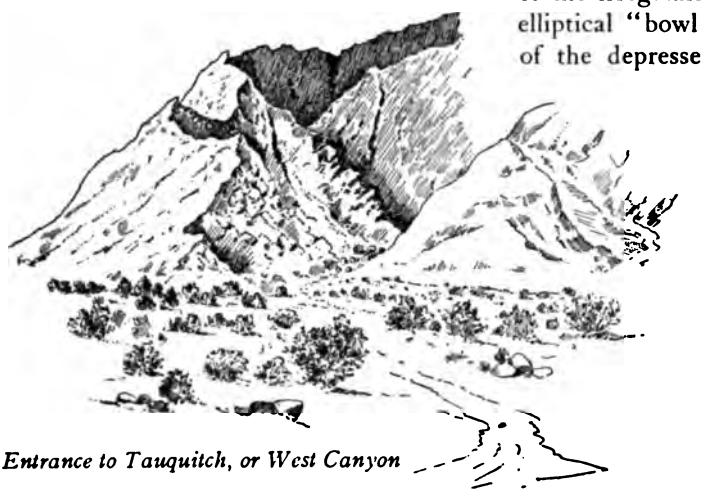
Thus wrote the poetic geologist after journeying over the desert.

Let us now begin our journey, but in the opposite direction from that which he took. Flanking the pass along its northern side stands the peak of San Bernardino with its glorious companion, San Gorgonio, their granite framework crowded up above the



beds of more recent rock about their bases, bearing aloft tattered fragments of pine forest, the summits piercing through a marbling of perpetual snow, up to a height of over eleven thousand feet. Fronting them on the opposite wall rises their compeer, San Jacinto, a dark crag of granite, with upthrusts of lava, whose flanks are cracked, riven, and waterworn into innumerable ravines, each catching a share of the drainage from the snow-cap in springtime, but in summer and autumn dry and thirsty looking.

Both these mountains have extensions which trend from the northwest to southeast, and which form the two elongated sides of the irregularly elliptical "bowl" of the depressed



Entrance to Tauquitch, or West Canyon

portion of the desert. The northwestern end of the ellipse is the San Gorgonio Pass. The southeastern end has no very elevated edge, though there is a slight ridge of sand here and there which gives the appearance of completing the ellipse.

Mount San Jacinto begins a grand range of mountains that edges the desert down to the boundary line between the United States and Mexico and then forms the backbone of the peninsula of Lower California, while the Sierra San Bernardino continues in broken-up masses to within twenty or thirty miles west of the Colorado River near Yuma.

Geologists tell us there is a distinct difference between the rocks

on each side of the San Gorgonio Pass, thus clearly suggesting that they are not of similar origin or age and are, consequently, of different systems. The pass, therefore, is not a low ridge in a homogeneous mountain chain, but the point of contact between two different ranges.

The slope on the eastern side into the desert is gradual and covered with rocky detritus washed down from the mountains. For over twenty miles the pass is so filled with boulders, pebbles, and gravel that it might almost be taken for the course of a vast waterspout. At about Whitewater Station, on the line of the Southern Pacific, the desert seems to begin in earnest, though there are still many shrubs and plants, and after a heavy rain the ground is fairly bespangled with beautiful flowers.

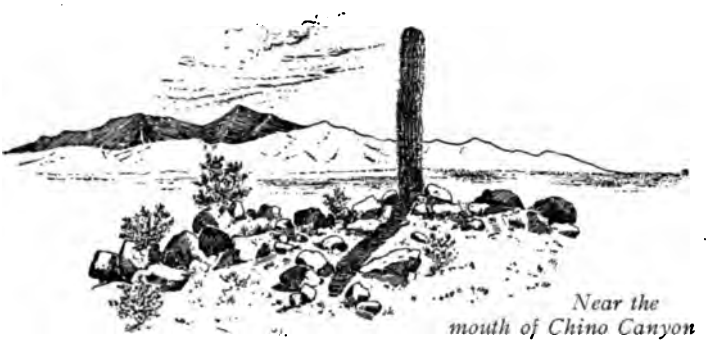
Standing here, too, one first becomes familiar with that breeze of the desert that comes as out of the very Dawn, pure, undefiled, and with the power of God in it, and one drinks in its celestial purity with eagerness and gratitude.

On the left the peaks of the San Bernardino range seem to retire farther away from us in solemn majesty, snow-clad, serene and sublime, while the lower hills that help make the pass are broad and wide, reaching to the other side with a gentle and beautiful slope.

On the right, the massive bulk of San Jacinto seems to have been thrust up right from the floor of the desert and arrested the quiet slope of the opposite range. Great spurs are thrust out from the base of the mountain, as if the intention had been to make arresting barriers to our farther progress, but they do not project far enough, so our train passes them and the far stretch of the desert ahead is exposed to our view.

It is a sandy waste, dotted everywhere with a variety of unfamiliar shrubs and plants, yet we find its features are strange and diversified in spite of its desert character. The two great ranges of mountains are seamed with canyons and ravines, and the irregularities of their surfaces cast purple shadows, giving to the masses a peculiar dimpled appearance which is exceedingly vivid. As we progress farther down the slope we find that for a distance of possibly fifteen miles, namely, from Indio to Mecca, the whole region is a beautiful oasis, owing to the fact

that artesian wells in large numbers have been bored, and the soil is of such fertile character as to grow most productively when under irrigation. This is the world-famed Coachella Valley, yet the name "Coachella Valley" is a misnomer. It was originally Conchilla Valley, and is so named on the maps of the United States Geological Survey. Conchilla means "little shells," and the name was given in early days from the fact that the whole valley of the Salton from the Mexican line as far north as Indio is covered with tiny fresh-water shells. Strangers, unfamiliar with the name and unacquainted with the Spanish tongue, mispronounced and misspelled the name, and, as they were the earliest white settlers, their methods soon established the custom, which it is not likely any one will now try to disturb.



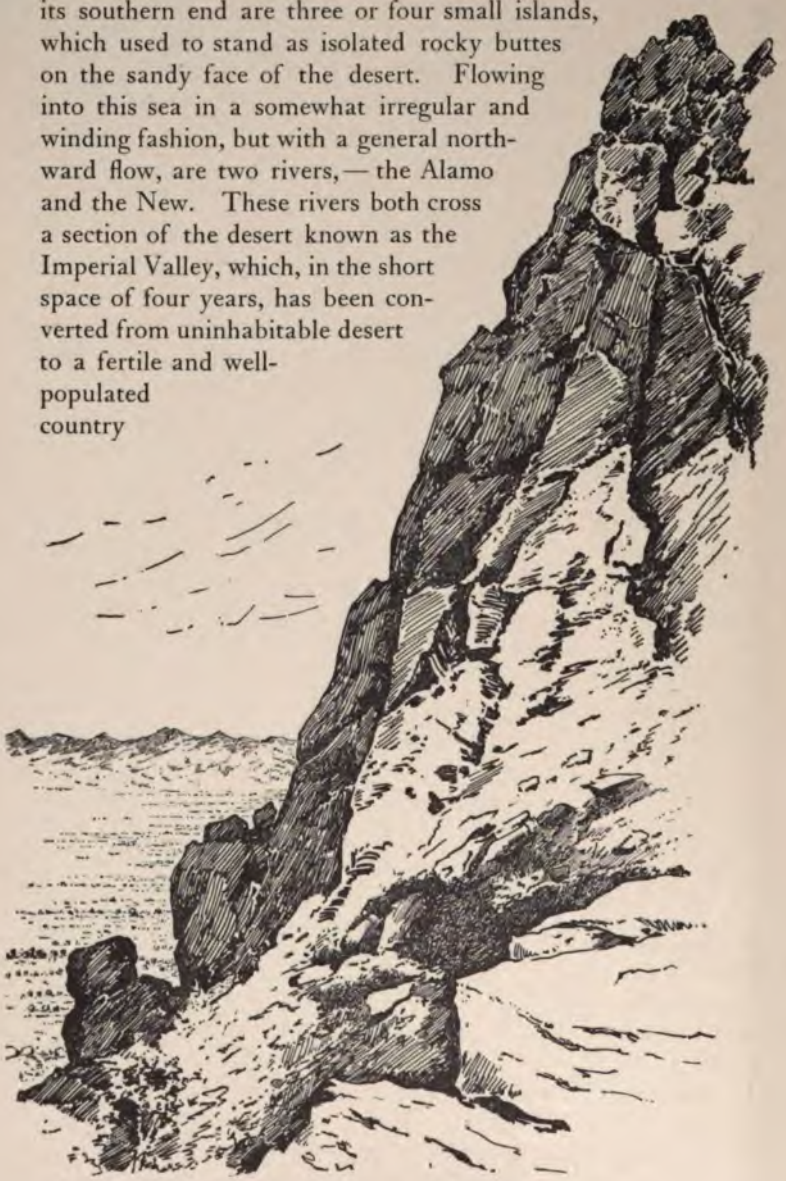
Near the mouth of Chino Canyon

Below Mecca the whole scene changes and the eye is fascinated and charmed with the presence of a vast inland sea. Can this really be a body of water or is it only a fiction of a disordered brain? We have long seen that we have been below sea-level, and the levels of the old beaches are clearly visible at more or less irregular intervals on each side of the valley.

We are now in the region known as the Salton Sink, and the body of water before us is the Salton Sea, the mysterious inland ocean which has given rise to so much foolish and imaginative writing by those who have never taken the trouble to investigate its origin.

At the present time of writing (June, 1906), this inland sea is over forty miles long and from five to twenty miles broad. At

its southern end are three or four small islands, which used to stand as isolated rocky buttes on the sandy face of the desert. Flowing into this sea in a somewhat irregular and winding fashion, but with a general northward flow, are two rivers, — the Alamo and the New. These rivers both cross a section of the desert known as the Imperial Valley, which, in the short space of four years, has been converted from uninhabitable desert to a fertile and well-populated country



The left wall at entrance to Tauquitch Canyon

by means of irrigation. All around this valley, as well as the upper portion of the desert, aligning and above the Salton Sea, the limits of the ancient beach line are to be seen. In some places this beach is composed of immense sand-dunes and ridges, and in a few cases these sand masses are large and imposing enough to be entitled mountains.

It is commonly believed that the valley region I have here described, from the San Gorgonio Pass to the Mexican line, bounded by the San Bernardino and San Jacinto ranges, comprises the whole of the Colorado Desert. This is a mistake. The desert conditions exist far beyond the confines of this limited area. The mountains of the San Bernardino range, though they seem to present insurmountable barriers, in reality have a number of passes, through and over which one may enter into the regions beyond. And what of these? They comprise a succession of mountains and valleys of all sizes, contours and forms. The valleys separate these mountains in most irregular and haphazard fashion. Some are narrow, some are broad and all are of different lengths, yet all alike are barren and desolate save when the winter rains bring forth marvelous carpets of flowers. Here, away from the vivifying water, everything is gaunt, harsh, and desolate. There are few signs of life. Everything is silent and still. During nine months of the year, save for the solitary eagle and the almost forgotten condor, which float noiselessly in the serene blue abyss above, there is never a sign of life, except when the weary prospector and his patient burro take up their plodding march from one water-hole to another.

On the opposite side the San Jacinto Mountains are not quite so barren and sterile as those of San Bernardino, yet they are desert enough, as the chapters devoted to our trips over them will show.

The appearance of the desert from the divide on the old stage road running from Yuma through the San Gorgonio Pass is thus graphically described by Clarence King. He was looking up the desert to the northwest from a point a little south of Imperial Junction:

"We were on the margin of a great basin whose gently shelving rim sank from our feet to a perfectly level plain, which stretched

southward as far as the eye could reach, bounded by a dim level horizon, like the sea, but walled in to the west, at a distance of about forty miles, by the high, frowning wall of the Sierras. This plain was a level floor, as white as marble, and into it the rocky spurs from our own mountain range descended like promontories into the sea. Wide, deeply indented white bays wound in and out among the foot-hills, and, traced upon the barren slopes of this rocky coast, was marked, at a considerable elevation above the plain, the shore-line of an ancient sea,—a white stain defining its former margin as clearly as if the water had but just receded. On the dim, distant

The ancient beach line near Torres

base of the Sierras the same primeval beach could be seen. This water-mark, the level, white valley and the utter absence upon its surface of any vegetation, gave a strange and weird aspect to the country as if a vast tide had just ebbed and the brilliant, scorching sun had hurriedly dried up its last traces of moisture."

Another remarkable desert view may be had from the summit of Pilot Knob. To the left and flowing almost due west the Colorado River leads the eye along to the sand-hills which begin a little to the south and then sweep far away to the north. To the west of the sand-hills lies the floor of the desert, including the fertile

region of the Imperial Valley; to the south lies the great alluvial deposit brought down by the Colorado during past centuries with, in the far distance, the portion of it subject to inundation, where dense jungles and forests of deepest green relieve the eye. Beyond to the far west are the Cocopah and San Jacinto ranges fading away in their bath of shimmering haze and suggesting that here, at last, the end has come, for beyond them is the home of the setting sun.

An equally vivid picture by another writer, J. Ross Browne, from the opposite, or southwestern, angle of the desert, and looking across almost due east, is well worth quoting:

"I scarcely remember to have seen a wilder country than the first eight miles beyond Carrizo. Barren hills of gravel and sandstone flung up at random out of the earth, strange jagged mountain peaks in the distance; yellow banks serrated by floods; seashells glittering in the wavy sand fields that lie between; these overhung by a rich glowing atmosphere, with glimpses of Indian smokes far off in the horizon, inspired us with a vague feeling of the wonders and characteristic features of the desert region through which we were about to pass. I could not but think of the brave old Spaniards and their heroic explorations across the Colorado. Here was a glowing and mystic land of sunshine and burning sands where human enterprise had in centuries past battled with hunger and thirst and savage races, where the silence of utter desolation now reigned supreme. There was a peculiar charm to me in the rich atmospheric tints that hung over the strange land and the boundless wastes that lay outspread before us; and I drank in with an almost childish delight the delicate and exquisite odors that filled the air, and thought of my early wanderings, years long past, amid the deserts and palms of Araby the Blest.

"As we advanced into the desert each shifting scene developed its peculiar beauties. The face of the country for the most part is well covered with mesquite trees, sage-bushes, greasewood, weeds and cactus. Mountains are in sight all the way across and the old stage-houses of the Overland Mail Company still stand by the watering places. Many indications of the dreadful sufferings of emigrant parties and drovers still mark the road; the wrecks of wagons half covered in the drifting sands, skeletons

of horses and mules and the skulls and bones of many a herd of cattle that perished by thirst on the way or fell victims to the terrible sand-storms that sweep the desert. Only in a few instances, when we struck out upon the arid sand belts that lie between the alluvial beds of earth, did we encounter anything resembling the deserts of Arabia, and then only for ten or twelve miles at a time.

"The climate in winter is indescribably delightful; in summer the heat is excessive and travelers and animals suffer much on the journey. It was a perfect luxury to breathe such pure, soft air as we enjoyed in the middle of December when our Atlantic friends were freezing amid the ice and snow-banks of that wretched part of the world.

"The entire distance from Carrizo across the desert to Fort Yuma is one hundred and sixteen miles. Four stations where water can be had intervene on the road,— Indian Wells, Alamo Mocho, Gardners and Cookes Wells. At all those points the water is tolerably good and there are other points where brackish water can be had by digging a few feet.

"About fifteen miles beyond Cookes Wells after coursing along the belt of the great sand desert on the left, we struck into the Colorado bottom. Indications of our approach to water were everywhere perceptible. Thickets of arrow-weed lined the way and forests of cottonwood loomed up ahead over which geese and cranes uttered their wild notes. Soon we passed some deserted rancherias and in a little while more our eyes were rejoiced with a refreshing view of the great Colorado of the West as it swept like a mighty serpent over the desert."

On the western slopes, and also on the northeastern edge of the desert, where the mountains are high and tree-clad, the ravines and canyons, in their higher reaches, are enlivened with small streams and occasional waterfalls. But as they approach the desert they flow more quietly, then sluggishly, as if fearful of the fate that surely awaits them. For, as soon as the devouring sands are reached, they are swallowed up, never to appear again, except perhaps in the alkali and brackish springs farther down which mock and tantalize thirsty men and animals. The Whitewater, in winter, often flows with enough volume and force to wash away roads and barriers erected to direct its course, and empties into

the Salton Sea. The overflow from the artesian wells at Mecca also unites to form a small stream which adds its tiny volume to the desert sea.

To the west of Indio and the oasis of the Coachella Valley there is natural verdure enough to attract attention, and this I have termed "Mesquite Land," for this interesting desert tree abounds there.

From the San Gorgonio Pass downward, and everywhere on the desert where the winds blow, the plants and shrubs present themselves in a new aspect to the stranger who sees the desert for the first time. On the windward side the sand is seen to be piled up in a peculiar conical ridge, the base of the cone being at the root of the plant or shrub. As the wind blows steadily and fiercely down the pass it carries away the sand except where

The fierce winds tear the sand away from the roots

the particles pile up around the farther side of the roots. This, better than anything else, tells the story of strong winds rushing in to replace the heated air which ascends from the scorched face of the desert within. In many places the mesquite and other trees are completely buried in the sand, except where the tips of the branches protrude. The effect of this is most peculiar, and yet beautiful and interesting.

In some of the canyons, especially near Palm Springs, and east and north of Indio, and even on the open desert, are groves of palms, indigenous to this region. In the presence of these ancient desert monarchs it is easy to forget the activity of American life, and all association with the occidental world, and imagine oneself in the heart of the Sahara.

Two solitary and detached mountains in the south attract our

In the canyon of five hundred palms

attention. These are Signal Mountain, over the Mexican line, and Pilot Knob, both well-known landmarks to Indians and whites, while Castle Dome and Picacho or Chimney Peak — the latter a sharp peak near the Colorado River a few miles above Yuma — are equally well-known and striking landmarks, though not so large as the other two.

Near the southeastern shore of the Salton Sea are four volcanic buttes (now made into islands), all of which are covered with lava float or pumice-stone. Tons of this material might be gained from these buttes, one of which is said to be the eminence on which the fabled Pegleg Smith mine is located. The island butte nearest to the railway is now the Pelican Island of the Salton Sea, for thousands of pelicans have made it their nesting and breeding place since the rising of the Salton.

While there is a large amount of sand on the desert, it does not, as is so generally conceived, cover the ground with particles so that little else is to be seen. There are scores of miles where there is no sand. In several regions it is piled up by the wind into hills of considerable extent and magnitude. The principal sand masses are found in the San Gorgonio Pass, east of the railway track below Palm Springs, west and north of Indio, in various parts of the old beach line east of Salton, Frink, and Volcano, along the line of the railway from about thirteen miles east of Imperial Junction to Pilot Knob, and on the line of the old emigrant road from Yuma to San Diego between Salt Creek and Carrizo Creek. This last-named mass is so important that of late years it has been known as Superstition Mountain. While it appears to be composed entirely of sand, there is a rocky mass below, and over this the sand plays, constantly shifting to and fro in the desert winds, and because of this instability the Indians of the region speak ill of it, hence its name. The great mass which makes a divide between the Salton Basin and the valley of the Colorado north of Yuma is the most extensive of all the sand deposits of the desert. This is the true Sahara of sand. On coming east from Yuma the traveler sees at Pilot Knob a line of sand-hills to the left, which continues for upward of thirty miles. At the station of Ruthven the smaller hills are close at hand, while a mile or so away are the larger hills. They are of every

shape and form. The winds from the north pile them up here and constantly shift their positions, sometimes covering the tracks, now and again burying a sign-board or a switch and requiring constant watchfulness on the part of the railway officials. Between the mile-posts 679 and 680 the sand again approaches the track and then dies away, the sand ridge sloping down toward the Salton Basin.

All these hills are "remarkable for their wave-like outlines and the purity of the sand. It is free from fine, earthy dust, and being perfectly dry moves about before the wind like the dry sand that has been washed on an ocean beach. The color varies somewhat in different localities, but is generally a light buff or reddish yellow, similar to ordinary river sand. A large proportion of the grains are translucent, and some are transparent." A

Sand-hills at Rimlon

most interesting fact is that when seen through a microscope many of these sand grains are complete spheres. The attrition caused by their constant motion has worn off all corners and roughness and left them perfectly rounded. Where the grains are of quartz, agate, garnet, or chrysolite they are most beautiful.

When, in traveling over the desert, one finds himself in the heart of these sand-hills, he finds them to be a series of mounds or hillocks of varying size and extent. Some are forty, fifty, sixty feet high, others much less. Therefore as one rides around their bases, or over some of the smaller ones, he finds himself shut in. Then, indeed, he can imagine himself in the precincts of a real sandy desert. A low, rustling sound is heard, produced by the moving sand grains. As a rule the sand does not rise high in the air, but bounds along on the surface, or only a few inches above it, so that the drift is enveloped in a sheet or atmosphere of

Copyright, 1903, C. C. Pierce & Co., Los Angeles, Cal.

IN THE SAND-DUNES ON THE COLORADO DESERT

moving grains. They generally rise to the slope, and when they reach the highest point fall down the steep bank to leeward. Several times on sleeping out among these hills I have had good opportunity to watch these phenomena. Lying down long before sunset I could see the constant movement of the grains, as if a slight moving mist of peculiar quality hung over the sand-hills, and, as I always stretched out my blankets on the lee side of the hill, I found a fair accumulation of sand deposited by the wind around and *in* my blankets before morning.

These dunes, from the security of a Pullman car or even from the safety of a wagon on a near-by road, seem very harmless objects, but let one unused to the desert beware how he risks his life in their dread wilderness. Once well in the heart of them one becomes utterly confused, for the wind completely destroys all tracks in a few minutes and it is impossible to retrace one's steps. While dissimilar when seen from a place of safety they appear all alike when one is in them. The heat is stifling, for the sands reflect the glare and heat, and one is almost blinded, and though there is wind it seldom reaches the secret recesses and little shut-in valleys of the dunes. It floats the sand over and upon you, and this heated sand irritates nostrils and mouth until one opens his mouth and pants like a dog, only to get more air so sand-laden that he cannot bear it. Many a poor wretch has been lost to the world forever in the treacherous secrecy of these sand-hills. Unthinkingly he has gone to his death,— been overpowered by the heat and thirst, and unable to find his way out, has fallen, to be covered almost immediately by the drifting sand and thus suffocated while unconscious.

The only safe plan I know of when thus caught is to take off one's coat and throw it over the head. Resolutely refuse to breathe through the mouth and by constant clearing of the nostrils compel inhalation by that channel. Sit down and make no attempt to escape during the heat of the day. If the sand begins to cover you, rise, and as it falls under you make it your new couch, and keep doing this so long as it is necessary. Then, when night falls, guide yourself back to safety by the stars. And one who cannot travel by the stars, and does not know the general direction of places in the desert, ought never to travel alone on it. He

does it constantly at the peril of his life, as half a thousand, at least, I doubt not, in the past fifty years have found out.

It is interesting here to note that in the sand-hills north and west of Indio, Mr. Fred Johnson is contemplating the planting of a sunken garden of date-palms similar to those found in the oases of the African Sahara. Part of his land reaches into these hills, and as he has an abundance of water he purposes to see if these apparently useless masses cannot be utilized for a good and profitable purpose.

Save for the Salton Sea, the Colorado, Alamo, and New Rivers, the flowing artesian wells in the Coachella Valley, and the streams like the Whitewater, Carrizo, and Salt, which run only in the rainy season or when the snows melt, there is no water to be seen on the desert. Here and there are the old Indian wells, dug deep in the ground, with one side sloped down to the very edge of the water to allow of easy access for man and beast, and all along the line are the railway water-tanks. Here and there are tiny springs, the water of which is carefully conserved, and along the roads to the north and east over the mountains and in the canyons occasional seepages, water-tanks in the rocks and bored wells are to be found. But in general appearance it is a waterless expanse, and one does not know how much he loves the sight of flowing water, whether in large or small bodies, until he finds himself upon the desert.

Prickly pear

In two or three places on the desert, but especially at the southern end, there are several large areas covered with small pebbles of various hard rocks, principally of volcanic origin, including different-colored porphyries, agates, and carnelians. These are beautifully rounded and polished, showing they have been subjected not only to transportation for long distances, which has caused marked attrition, but also to the smoothing influences of wind-driven sand. The wind has carried away all the sand particles from the interstices and the pebbles are left, packed together so closely and evenly, owing to their uniformity in size, that they seem as if pressed into a yielding surface by a heavy roller. This surface of pebbles is found to cover a mass of sand which lies below. Its protective value is obvious. Without it the sand

would be blown to and fro by the winds and thus add to the discomfort of residents and travelers.

It should be noted in this connection that the polishing of these pebbles is not accomplished by a steady wind blast in one direction, as that of the San Gorgonio Pass, but by the action of a finer-grained sand and dust, blown to and fro by the varying winds.

On the Yuma and San Diego road after leaving Cameron Lake lies the Yuha Plain, the most desolate, forbidding, barren, and terrible part of the whole desert. It is largely volcanic, several cone-shaped peaks rising from the blackened plain beneath. It is below sea-level and the rocks of the plain and the

Freaks of erosion in the Yuha country

bases of the near-by western mountains are washed and eroded in a wonderful manner. A recent writer thus describes them: "Mingling with the burnt stones and volcanic debris are rocks worn by the waves and shaped into hundreds of fantastic forms. There are many acres of these stone curiosities, and certain sections of the fields seem devoted to certain shapes and figures.

"For instance, one passes through a region which he at once names the cabbage patch, for it presents the appearance of a field of those vegetables which have turned to stone. The waves have worn the rocks into round boulders about the size of the vegetable which they so much resemble, and have cut into the globes, laminating them in perfect imitation of the leafy layers of the garden vegetable.

"Another locality is devoted almost exclusively to dinner-plates. Thousands of rounded, thin disks are scattered over the plain or are piled scores deep in singular piles, each piece shaped exactly like the crockery which adorns our tables, and quite as thin and symmetrical.

"Another section of this truly wonderful region is given almost wholly to dumb-bells. These vary in size from pieces weighing one or two pounds up to those seemingly calculated for exercising the muscles of a giant, and weighing thirty or forty pounds each. In almost every instance these natural dumb-bells are well balanced, the balls at either end of the connecting piece being of the same size and weight.

"There is, in this plain, an arsenal, also. While guns and swords and bayonets and powder were not there to be found, there are thousands of cannon-balls varying in size from two- and three-inch balls to those fit for the big thirteen-inch guns of modern warfare. And all are of stone. All formed in Nature's workshop.

"There are other objects innumerable. There are stone roses, stone lilies, stone tulips, stone leaves, stone birds, stone animals, stone quoits, stone ornaments in varied and unique designs, stone canes — in fact, an immense variety of things imitated in stone on the plain of Yuha.

"In the direction of Carrizo Creek, in one portion of Yuha, rise two hills, or small mountains. One might mistake them, in the distance, for ancient craters, but when he approaches the eminences he discovers them to be monuments to an ancient life — the records of species now extinct. They are shell mountains; great beds of prehistoric bivalves which were left stranded when that ancient sea swept back from the region and left a dry and desolate land.

"One of these mountains, the larger one, is composed wholly of large rough shells, much larger but less elongated than the shells of the modern oyster, which, in some respects, they so much resemble as to lead to the suspicion that they are the remains of the ancestors of our much-prized bivalve.

"The lesser hill is composed of tiny shells of a prehistoric type of brachiopoda. Like the larger shells, they are found, except on the surface, in an undisturbed state, both valves of nearly every shell being found in position. Although the mollusk dwellers of

these shells vanished several centuries ago, so perfect are the shells one almost expects, when he opens the valves of the shell, to find the living creature within."

Until the Salton Sea covered them in May, 1906, one of the most interesting and peculiar features of the desert was the so-called "Mud Volcanoes." There is another group of these below the Mexican line in the vicinity of Volcano Lake. While the upper group were first noticed after the earthquake of 1852, they are undoubtedly of much prior existence. They were boiling springs of quicksand and mud that had thrown up their own cones to a height varying from a few inches to fifteen or more feet. They are now drowned out by the Salton a few miles southwest of the station of Volcano.

Picacho Peak and ocatilla

On the southwest side of the point below Fig Tree John's, about twelve or fifteen miles toward the mountains, is an area over half a mile square, covered with the cones of a mud volcanic region similar to the one I have just described. But these are all dead. The cessation of activity left the cones to the forces of erosion. Wind, storm, rain, and sand are playing havoc with them, and they are now rapidly succumbing and weathering away. In exploring the region, however, one must be exceedingly careful to avoid serious injury, or, perhaps, death, for the chemical and aqueous agencies long ago at work here have tunneled strangely into the crust of the earth. Great chambers, long galleries, far-reaching corridors, tall chimneys, sloping chutes, and yawning abysses lie in wait, merely covered by the calcareous and other deposits of the volcanoes. In treading one is liable to step on one of these covered pitfalls and drop to disaster or death below. Being out of the line of any travel and in a region not at all alluring or suggestive even to a prospector, this "devil's half-mile" is practically unknown, save to a small handful of the adventurous spirits that love to penetrate even into mysteries that seem to be profitless.

All through the summer and occasionally during the winter dust

whirlwinds may be seen in different parts of the desert. These spiral shafts of whirling sand rise to the height of one, two, even three thousand feet, and while to be in their course is to be covered with dust and to have one's hat and clothing and hair tousled and roughly handled, to stand apart and witness them, like shining shafts of marble, glistening in the sun, moving along with stately majesty, is to witness that which is as inspiring as it is novel.

Distances on the desert seem much shorter than they really are. In the early days the government surveyors, familiar with distances, estimated the distance of the termination of the San Bernardino range from the Colorado River at four miles. They found it to be thirteen. Every party of prospectors has a similar experience. Its members start out to reach a given spot. In the cool morning air they are exhilarated and confident. They ride or drive or walk and the object gets no nearer. The hot sun comes out and scorches all exuberance out of them and they plod on in weary desperation, and yet they seem to be little, if any, nearer. Their water gives out and they suffer agony, but still drag one foot after another, and yet their destination is far away, and, unless some one has had intuitive foresight or unusual precautions have been taken, another party returns to civilization with one or more of its members left dead on the desert.

The clarity of the atmosphere has much to do with this deception, for it enables one to see as if through field-glasses, but the chief reason is found in the lack of moisture in the atmosphere. Moisture sets out the various parts of a mountain range in true perspective; each ridge has a moist atmosphere, so to speak, to float in and make it stand out from every other ridge. This enables the eye to judge of comparative distances. But on the desert one ridge is superposed upon another, one range upon another, and the eye is unable to segregate them. Not until one is close upon them are the separations noticeable. Then, too, the clarity of the atmosphere, combined with the rarity of objects of comparison, aids in the deception. The very barrenness of the desert aids in making distances illusive. Were its vast spaces filled up with towns and cities, forests and rivers, even though its atmospheric conditions could be preserved (which, of course, they could not), the illusions of distance would be materially decreased.

As to the heat of the desert, the temperature has a wide range. In winter the climate is delicious beyond compare, but in summer it is hot, 120° Fahrenheit being not uncommon.

Hot? Yes. So hot that in the fertile part of the desert many of the workmen, plowing, harrowing, sowing, reaping, or what not, go two or three times a day and incontinently tumble themselves, clothes and all, into the irrigation reservoirs, then walk out and coolly go on with their work.

Hot? Yes. So hot that I know men who turn the hose upon their bed and sprinkle it down about five or six o'clock in the evening in order to cool it off before they retire.

In the summer months it behooves every stranger upon the

A Yuma Indian building his house

desert to beware how he tempts Providence. Many a man, who had even become somewhat acclimated, has lost his life by being too bold, too confident.

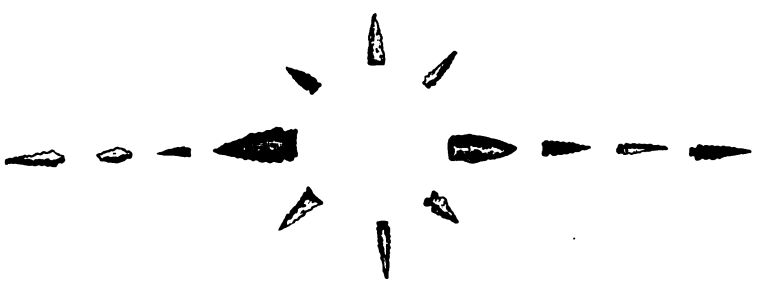
There are several regions that may be termed the oases of the desert, such as Palm Springs, the Coachella Valley — which includes Indio on the north and Mecca on the south — and the Imperial Valley. These are all caused by irrigation and are beauty spots, indeed, when compared with the barrenness of the surrounding country. Their origin and growth and the marvelous results that experience has demonstrated are to be looked for by further efforts are worthy of the more extended observation that will be accorded in other chapters.

Between Parker, Arizona, and Picacho, California, lies the great

valley of the Colorado River. This is an alluvial valley one hundred miles long and about eight miles wide. It contains not less than five hundred thousand acres of good and fertile land needing only irrigation to make it as productive as any in the country.

There are comparatively few Indians in the desert region. The group of villages of Coahuillas in "Mesquite Land" and the contiguous mountains, the Chemehuevis and Yumas on the Colorado River, and a few nomad Cocopahs now and again located near to Calexico, with their primitive dwellings, are the only representatives.

These, in the main, are the physical features that characterize the Colorado Desert. Though, in the following pages, I have confined my descriptions to the region north of the Mexican line, it must not be forgotten that no arbitrary political boundary sets off the Colorado Desert. The same conditions exist to a greater or lesser extent below the line as above.



CHAPTER II

The Physical History of the Desert

DESERTS are made, not born. Like Topsy they "grow." The sands and beaches and mineral deposits and mountains of a desert like the Colorado are an accretion, a more or less slow growth, not a sudden birth. The geologists have discussed the problems involved in the birth of the mountain ranges of the desert, and seem to be agreed that they are of a later date than either the Coast Range or the Sierra Nevadas.

Beyond the San Bernardino ranges to the north and east are numberless smaller ranges, most of which are volcanic. These and the consequent valleys between fill up the space between the sands of the Colorado Desert and those of the Mohave. These volcanic ranges are scattered in careless confusion over the whole area. There is no parallelism, no uniformity of direction or size. They are alike in their rugged barrenness, their inhospitable character, their almost freedom from verdure, and the scarcity of water. Almost the whole region east and west of the Colorado River for six hundred miles of its course above the gulf may be said to have the same singular characteristics. The plains and valleys between the mountains are low, hot, arid, and scantily clad. The exceptions from these generalizations, both in place and time, are fully noted elsewhere. During the summer months the sun pours down its fierce heat upon the sands and rocks untempered by clouds above or forest shades beneath. Rains fall seldom, and when they do come they generally fall with such suddenness and large volume that they sweep over the country with uncontrolled force, dashing down the bare mountains in unrestrained torrents and over the plains in floods which carry

everything before them. Disappearing almost as rapidly as they come, they leave no nourishing moisture behind; indeed their sudden onslaught seems to do more harm than good, for they wash away a large part of the humus that, with pathetic patience, the sand and rocks seek to accumulate from the few desert plants and shrubs that desperately cling to the inhospitable region, refusing to be ejected.

Originally here were but few springs, and though I have written a chapter on the rivers of the desert only the Colorado is reliable in its constant flow. The others are intermittent, now flooding the regions through which they pass, washing out roads, carrying away bridges and railway tracks, destroying irrigating aqueducts and ditches and ruining growing crops, and then ceasing entirely; so that a stranger passing over their course is apt to deny their very existence. Capricious, uncertain, wilful, and destructive, they are not like the beneficent rivers of the East that flow placidly along through fertile meadows, friendly to man and beast and yielding themselves to the general aspects of civilized countries. Like the wild animals that lave in their waters and the sterile country through which they pass, they must be tamed and made subject to the will of man ere they will yield anything of beauty to the landscape, nourishment to the soil, or comfort to mankind. The few springs have been fostered and cherished by dusky aborigine and white settler alike, though their waters are for the most part either saline or alkaline. Few, if any, of the older known springs, save in the higher reaches of the mountains, but contain minerals in solution in distinct quantities, so that both man and beast, used to the purer water of more hospitable regions, seek in vain to quench their thirst. Only habitude renders the waters palatable and acceptable. The story of how many of the wells came to be dug is told in the chapter on the pathfinders, and when one stands by the side of these pathetic scenes of man's struggle to wrest this necessary element from the hostile desert he feels to the full the measure of will power, of indomitable energy, of dauntless courage, of persistent effort his fellows are capable of making in order to carry out their inflexible will. Recently artesian wells have been bored in the upper portion of the desert, from Indio to Mecca, and this one factor has changed

Photo. by H. C. Tibbitts, San Francisco, Cal.

COLORADO DESERT FROM ANDREAS CANYON, CALIFORNIA

the region from barren and waste sand to fertile and rich farms, where melons, cantaloupes, figs, oranges, grapes, and small fruits grow to perfection and are ready for market many weeks ahead of those grown on the seacoast side of the mountain ranges.

There are three principal soil levels. The first is best seen when descending into the desert over the San Gorgonio Pass. It is formed of great masses of rock, gravel, and detritus, washed by cloudbursts down the canyons and sides of the steep mountains and swept far out over the sands. Standing at Palm Springs station and looking to the northwest a great "fan" of this rocky detritus is seen, many scores of feet high and extending for two or more miles into the heart of the desert. The second level is of sand, representing the former beaches and bed of the ancient

The San Gorgonio Pass

sea, while the third is composed of layers of clay, fine sand, and silt, laid down in the still water of a fresh-water lake. The evidences of this fresh-water lake are as abundant in its beaches and shells as are the evidences of the occupancy of the region by the gulf. All along the foot-hills, seen to the right after the train leaves Palm Springs station, and approaching Indio, are discolorations in an even, horizontal line and extending for a long distance. These are calcareous incrustations which cover the surface of the rocks and enter into every cavity and crevice. At Indio the people speak of them as "the coral reef" and take their friends and visitors to see them as a great curiosity. This crust was undoubtedly deposited under water, and on examination is found to be cellular and full of small spiral shells. These shells

also are found in vast quantities on the clay and are scattered all over the region from Indio to the Salton Sea and below. In some places they actually whiten the ground and can be shoveled up by the millions. They are all fresh-water shells of the *Planorbis*, *Anodonta* (*A. Californiensis Lea*), now found in the Colorado River, *Physa* (*P. humorosa*), and *Amnicola* (*A. protea* and *A. longinqua*). The Physa is still found in some of the springs on the New River.

While the surrounding mountains have contributed their quota to the sands, gravels, and clays that constitute the floor of the desert, they have yielded but an infinitesimal part of the vast quantities that have here found lodgment and home. The history of these sands and their removal to this region is one of the most fascinating chapters of dynamic geology and one which more fully, perhaps, than any other manifestation of natural power sets off its majesty as compared with the pygmy endeavors of man. The full history can be read only by years of study in the mountains where the Colorado River has its birth and in the plateau regions through which it and its tributaries flow, but a good substitute for these years of personal investigation and study may be found in Major Powell's great book on the "Canyons of the Colorado." Here he traces, step by step, the growth of the mountains, their steady uplift out of the primeval oceans, the birth of the river, the slow cutting down of its mountain channel to correspond with the land's uplift, and the denudation and degradation of the rocky strata of the country for many hundreds of miles. All the rocks and sand and débris of these strata found their way into the Colorado river-bed, there to be tumbled and tossed, rolled and crushed, battered and pounded out of all resemblance to their original rocky form and carried either bodily, by the force of the stream, or in solution, to be voided violently at its mouth or deposited gently as the flow of the river grew more sluggish.

See, then, this native bowl of the Colorado Desert. Comparatively little of rocky débris had flowed into it from its own immediate mountains. The waters of the Gulf of California reached up as far as the slopes of Mounts San Jacinto and San Bernardino, taking in all the region now known as the Imperial

Valley, the Salton Basin, and the Coachella Valley. It stretched away to the south as far west as the Cocopah Mountains, which are an eastern offshoot of the Sierra San Jacinto. Beyond the Cocopahs, also, the gulf extended, over what is now called the Maquata Basin, to the slopes of the main range and up in the direction of San Diego. The whole of the present delta of the river was included, so that there was an area of over three thousand square miles which, in those prehistoric days, was included in the Gulf of California and covered by its waters. And this area does not include the Mohave Desert. How came about the change, and whence all this vast volume of sand to fill up so large an area? As I have elsewhere shown, the Colorado River is the answer. It was the excavator, the steam shovel, the power dredger, the carrier, the depositor of it all. Unaided it has accomplished what all the men of all time with all the machines ever invented could not have done.

From many evidences it is assumed that the river, at this time, emptied into the gulf not far from Pilot Knob, pouring out its waters in a southwesterly direction against the Cocopah peninsula. Day after day, week after week, month after month, year after year, the surcharged river voided its load into the open gulf. It is more than probable that the coarser and heavier materials were deposited near the mouth of the stream, thus forming a perpetually growing encroachment upon the waters of the gulf. Little by little the bowl was filled up, until at last the material brought down by the river began to show above the face of the water at low tide. This deposited material then asserted its will over that of the river. It said in effect, "You shall not deposit all you bring right here. You must carry it farther down," and in sullen anger the river slowly and sluggishly obeyed.

But when the snows of the winter were melted by the summer's sun in the high mountainous regions and "a million cascade brooks united to form a thousand torrent creeks; a thousand torrent creeks united to form half a hundred rivers beset with cataracts; and half a hundred rivers united to form the Colorado," and all these brought their large quota of mud, sand, pebbles, and rocky débris and poured them into this one great river, it occasionally rose in its mad, wild fury and shot its unwelcome load wherever

it would. At such times it broke all the bounds it had made for itself by previous depositions in the gulf.

During one of these floods it voided so vast an amount of sediment that the area directly in front of its mouth was covered to a height much above that which the water itself attained when the flow was normal. As a result, when the flood subsided, a great dam was found to have been built which shut off the northern portion of the gulf, that which included the Imperial, Salton, and Coachella Valleys. "Under these conditions," says Professor Blake, "the channel connecting the upper and lower portions of the gulf must have gradually become more and more shallow, and the continued growth of the delta must have filled it up, so that the tide could no longer ebb and flow to the upper end, thus forming a lake, its only barrier on the south being the silt and mud of the Colorado. This barrier was probably an extended flat, and not a narrow bar, for the silt was undoubtedly much spread about by the tides and the current caused by influx of the river. A very considerable portion of the silt was doubtless carried to the extreme northern part of the gulf, forming the foundation for the superstratum of clay of lacustrine origin which we now find there. The accumulation, however, was undoubtedly most rapid and deep opposite the mouth of the river, and it must have formed an effectual barrier between one part of the gulf and the other. It must have been covered by only a few feet of water, and was thus left entirely bare at low tides. Such conditions were most favorable for the rapid growth and transformation of the flats to dry land or salt marsh. Every great freshet in the stream must have made great additions to it, until at length it was submerged only when the tides were very high and the river much swollen. In that climate, a surface of mud exposed to the sun and air, and so well watered, must have been covered with a luxuriant growth of tule, grass, and other vegetation; and it doubtless existed for a long time as a low swamp, traversed in every direction by sloughs and channels.

"It is probable that even after the delta had so far grown as to be above the water, there were numerous narrow canal-like channels between the river and the lake, or between the lake and the gulf; so that the water in the lake was constantly retained at

the same level. That the lake received its supply of water, in great part, from the river is shown by the fact that it was *fresh water*, or but slightly saline; the presence of salt or brackish water being proved by the fossil shell *Gnathodon Lecontei*. The great deposition of clay containing the shells probably took place in this way; the current of the river being at times, if not constantly, turned in that direction. In this case the excess of water, if not removed by evaporation, must have flowed out into the gulf by some channel farther south. It is not impossible that the Colorado once flowed along the line of banks or terraces near Cookes Well and the Alamo, and after depositing its silt in the quiet water of the lake, escaped to the gulf, at some point near or below the present entrances to New River. With the immense quantities of silt that the Colorado brings down, even now, such conditions could not long remain, and the river must have been turned toward the more open waters of the gulf by the resistance of its own depositions. After the lake had become deprived of its supply of water from the river, and its communication with the gulf became closed, except, perhaps, at seasons of freshets, it must have undergone rapid evaporation, especially in that region of violent arid winds, pouring in from the surrounding deserts and over the mountains from the sea. It is not difficult to comprehend that this cause was sufficient to remove all the water from the lake in the course of a few years.

"Some of the conditions which have been detailed as probable are still found to exist. The Colorado yet continues to overflow at seasons of high water, and the water runs backward for sixty miles, and forms a chain of small lakes or ponds; the water in these evaporates rapidly, and disappears soon after the supply ceases. We find an extensive area of low and marshy land around the head of the gulf, which is annually overflowed and covered by quantities of silt spread out upon it by the Colorado. Father Consag, who made the first survey of the gulf in 1746, ascending as far as the mouth of the Colorado, describes the land about it as low and marshy; the mud being red, and so soft that it would not support the men when they stepped out upon it. The enormous quantities of silt carried down by the river is shown not only by the dark-red color of its water, but by the discoloration that

it produces in the water of the gulf, which was formerly called the Vermilion Sea, probably from its red color."

I have thus presented in full Mr. Blake's theory of the formation of the Salton Basin. It was the first, and so far has been the only scientific presentation of the subject. I am inclined to think, however, that slight divergences from his theories may be noted, based upon my recent studies of the Alamo and New Rivers. These differences will be noted as the careful observer reads what follows.

Assuming the casting up of the natural dam and the isolation of the northern portion of the gulf, it will be seen that it was still full of salt water, — water brought in by the tides that rise and fall in the gulf. Being thus shut off from the gulf and receiving no material inflow from any other source, evaporation soon dried it up.

Some geologists in accounting for this shutting off of the desert from the Gulf of California assert that it was partially attributable to one of the slow uplifts of which we have so many evidences throughout the geological world. This seems to be more an assumption than a scientific deduction, for careful measurement of the old beach lines, which are found all along the walls of the desert, shows that they have the same elevation as the present-day sea-level. It would appear, therefore, that there has been no uplift of the region since the gulf occupied it, but rather that the river itself caused its isolation, and evaporation carried off the imprisoned waters. In the meantime the river built up a channel for itself higher than the surrounding country which it had made,— a channel which flowed to the east of the great dam it had formed and with a general trend southward. Floods still continued to be made by the melting snows of the mountains, and possibly each year the river overflowed its self-made channel into the low-lying country beyond. By this time — for it would take but a few short years to completely dry out all the salt water from the isolated basin — the desert bowl possessed somewhat the appearance it has for us to-day. The sea beach line was formed, and the great piles of sand were being dried out and carried to and fro by the winds as they are now.

Then came a flood which broke over channel and dam alike and formed the course of what we call the Alamo River. This was

the channel through which a portion of the waters of the Colorado was poured into the basin and made of it a fresh-water lake. Year after year it flowed, and maintained the fresh-water character of what had, in comparatively recent times, been an arm of the gulf, then a salt lake, then a dry basin. It was at this time that the fresh-water shells were deposited of which millions are now found, and the calcareous matter deposited which forms the "coral reef" west of Indio.

Possibly it was while the bed of the basin was dry that the aborigines first came and dwelt in it. If so, this would account for their tradition that long after they had occupied the region the floods came and drove them out. But I am inclined to the opinion

Salton Sea by moonlight

that this occurred not once, but many times. The new channel of the Alamo may have conducted the waters for many scores of years or even centuries into the fresh-water lake, — for, of course, its waters would now be fresh owing to its isolation from the gulf, — and during this period another overflow cut the channel we call the New River. For there is no reason to assume that the New River is a recent creation, any more than that the Alamo is. The same conditions that caused the Alamo may also have created the New, and the geological history of both confirms this theory. Both have been fresh-water channels to the Salton Basin from long before historic times.

Then came another flood epoch, which built a dam across the Alamo channel. This closed part of the fresh-water supply and

finally, when another flood closed the New River channel, the Salton Sea again dried up, this time leaving the evidences of its fresh-water history.

The evidences are clear that the Alamo channel had its entrance not far — a few miles to the north or the south — of the intake cut by Engineer Rockwood of the California Development Company, so that he was merely doing what Nature had done centuries before, and at the same time undoing some of Nature's later work. Thus we have the spectacle again presented to us of the Salton Basin filling up with the fresh water of the Colorado River. Unfortunately the conditions now are not so simple as when none but a few nomad Indians occupied the dried-out sea bed. Miles and miles of railway, a score or more of towns, and fully fifteen thousand inhabitants, with their homes, their orchards, their farms, their all, live in the bowl of what in turn has been gulf, salt sea, and fresh-water lake. Hence what man can do to arrest what would once have been regarded as the simple and natural course of nature he will do with energy, persistence, and success, and the Salton will erelong revert to its former condition as the Colorado is forced back into its old channel.

While there are many other dynamic problems connected with the desert, these will be found discussed elsewhere to prevent repetition, my chief aim, in this chapter, being to make clear the theories I hold as to the successive steps in the history of the peculiar and distinctive below-sea-level feature of the Colorado Desert.

CHAPTER III

Desert Surprises

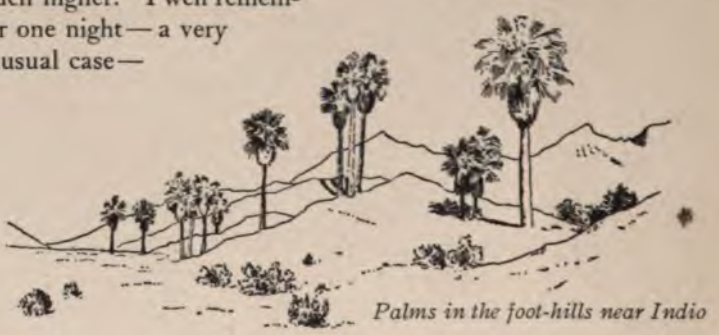
THE horrors, terrors, discomforts, and harsh conditions of the desert have so largely been dwelt upon by writers and others that there are few people who are not filled with misconceptions as to what the desert really is. To such the desert — *as it is* — is a place of perpetual surprises. One morning I found myself recounting these surprises. The long list of them amazed me. This chapter is the result. It is merely a condensation of what will be found treated more fully elsewhere in these pages.

One of the first great surprises is the clarity of the atmosphere. Even to those well acquainted with the clearness of Southern California — the peopled portions usually known by that name — the especial transparency of the desert atmosphere comes as a delight and a surprise. Everything stands out with startling vividness. Every line of the mountains is as sharply defined as if newly cut; each dent and dimple, canyon and peak, is clear and clean cut. In the early morning when there are no heat waves, no haze, no flying sand, there seems to be no limit to one's vision. Size, of course, suffers, but everything, no matter how far distant, is clearly to be seen.

The large, bright beauty of the stars is a surprise. Only on the desert are such stars and such evening skies ever seen. In a vault of pure, deep, turquoise blue each star stands out with a vivid luminosity that is startling. They seem larger as well as clearer. In the presence of such stars one can better understand the story of the wise men who came to see the infant Jesus, led by the star in the East. In such a desert atmosphere a large star would blaze with a power of attractiveness no intelligent mind could resist.

And, oh! the surprises of the night. Heat, fierce, blazing, scorching, intense all day! Then, as soon as the shadows fall, how soothing, how restful, how delicious everything becomes! The coolness, like a silent dream river, flows all over and around you, and then into you and you feel the restful influences as a real thing entering into your being. The calm quietude seems a foretaste of that future we think of, "where the wicked cease from troubling and the weary are at rest."

The heat of the desert is a matter of great surprise to most people. Temperatures, in the shade, of 110° Fahrenheit, 120°, and even 130° are not uncommon, and once in a while it reaches 140° and even higher. Out in the sun the thermometer must be much higher. I well remember one night — a very unusual case —



Palms in the foot-hills near Indio

where the thermometer registered 128° at midnight. To those familiar with the enervating and depressing heat of the moister atmospheres in the middle western and eastern states these figures seem incredible, and the wonder is not lessened when it is discovered that white men as well as Indians work all through the summer in these temperatures, without fear of sunstroke, which is practically unknown, and are both healthy and happy. Yet the heat is intense. Let this be not misunderstood. I do not wish to minify the frightful and scorching heat of the desert, and its effect upon those who are unused to it. At first it seems as if it would paralyze one, as if he must dry up and blow away. This, of course, is in the hottest days of summer. These are the days when it is suicide for the stranger to attempt to go out alone on the desert, and yet, strange to say, many a new prospector

will make his initial trip at such a time, thus giving rise to another of the desert surprises. For is it not surprising to a remarkable degree that an intelligent human being will start out on such a dangerous trip without due regard to his safety and without consultation with those who are able to advise him? Many a bleached skeleton is all that is left to tell of the foolhardiness of those who have dared the fierce desert heat in this manner.

Yet there is a very definite reason for this self-evident foolhardiness. It is another of the surprises of the desert. The clarity of the atmosphere makes distances deceptive. This is now so well known that few are not aware that the fact is as stated, and yet, such is the reliance one places upon his judgment or on the unsupported evidence of his own senses, that he will not accept the warnings of those who know, but walks directly and seemingly with wilfulness into the greatest danger.

This, however, is only a small part of the explanation. During the cool of the early morning, while the air is like champagne or some electric fluid coursing through his veins and giving to nerves and muscles unwonted sensations of stimulus and exaltation, it requires a more than usually steady brain to keep one from forgetting the limits of his strength and the change a few hours will bring. Heat? What heat can hurt him feeling as he now does? Water? He can walk thirty miles as easily as five in this atmosphere. And he starts out under the influence of this delicious desert intoxication — I have done it myself many a time — only to find suffering awaiting him later, and, if he be very ignorant of desert conditions, possibly death. Even old prospectors are occasionally bewitched into carelessness by these seductive electric conditions, and the older and wiser the prospector the less willing is he to take any chances. For the midday and afternoon heat are blistering and burning beyond conception of the mind familiar only with ordinary conditions.

And yet, strange to say, in spite of this heat the wonderful range of temperature found on the desert and its environs is one of its greatest surprises.

When you tell the stranger that the thermometer registers as low as 17° Fahrenheit, or fifteen degrees below freezing, a very much lower temperature than is found in the better known parts

A lone palm in Andreas Canyon

of Southern California, he finds it a difficult statement to believe. If, in addition to this, you include the temperature of the mountains of the desert in the range, the figures are more startling still, as it is asserted (no observations having been made) that on the summits of San Gorgonio and San Jacinto a temperature far below zero is to be found.

Here then, given a zero temperature, we have a range from zero to 160° Fahrenheit, surely a wide enough variation to satisfy the most exacting.

But it is not only in the wide ranged temperature recorded at different times and places on the desert that surprises lurk. One is sometimes met with a climatic change in a short walk or drive that is startling in its suddenness. Some atmospheric phenomenon causes an immediate radiation of heat, or influx of cold air, that is almost paralyzing. Once in riding out from Palm Valley to Palm Springs station I left in a most comfortable temperature. It must be remembered that the valley is completely sheltered from the north and west by the gigantic walls of Mount San Jacinto. The moment we emerged from the sheltering walls a fierce, cold, penetrating blast, rushing with great speed down through the San Gorgonio Pass, struck us and ere we reached the station we were almost stiff with the cold.

The reverse of this experience, where one goes from the cold or hot wind of the San Gorgonio Pass into the perfect shelter of the spur on the way to Palm Valley, seems little short of miraculous to those who have not been informed and who do not comprehend the simple explanation of the phenomenon.

Rain on the desert is always a surprise. Strangers gaze in wonder at the simple event and ask in amazement, "Rain? Why, I thought it never rained on the desert." The desert dweller, who during a hot and rainless spring, summer, and fall almost forgets how it looks and feels to have the beneficent showers fall upon him and the dry and thirsty country around, and who feels thirsty at every pore, never gets over his surprise and delight when the first rains of winter come. But to see and feel it rain in the middle of a hot summer, who can describe that? Yet it sometimes occurs. To see the thirsty ground, the shrubs and trees drink it in, and to feel the delicious moisture penetrating

every pore of the skin and soothing every nerve and muscle and gently stealing even into the brain and easing up the dry, taut feeling there, while at the same time it fills the veins and makes the blood flow more fluidly,— that is surprise and delight that few have ever realized.

Rain generally falls from December to February, but there are showers sometimes in the heart of the summer.

And in this connection one cannot ignore the surprise he feels at the power of the Indians to foretell these unusual showers, or the abundance or scarcity of the regular rains. This past summer one of the Palm Springs Indians definitely assured us, "Heap plenty rain this winter. We catch 'em lots." And so it proved, for the winter of 1905–06 has seen a large rainfall.

It will be a surprise to many to learn that in variation of altitude the Colorado Desert is the most remarkable place now known on earth. The San Jacinto Mountain is its northwestern outpost with an elevation of 10,805 feet. The Salton Basin is 253 feet below sea-level. In a direct line the distance between the two is approximately twenty-five to thirty-five miles, so that in that short distance the desert gives us a variation of altitude of over eleven thousand feet.

But if one should object and say the mountain summit should not be regarded as belonging to the desert, we will take the town of Banning as the highest point or outpost of the actual desert. Its elevation is 2,317 feet, which, added to the Salton Sink depression, gives a variation of 2,570 feet in a distance of less than one hundred miles.

There is a peculiar charm and surprise about the odors of the desert that needs comment. Each odor is vivid and distinct, and can readily be distinguished from its fellow. It is as if the pure atmosphere compelled a segregation of odors rather than a commingling of them. I remember one night walking along in the warm air of the virgin desert with the vivid odor of the creosote bush filling the nostrils. Suddenly we entered a stratum of cooler air. The creosote disappeared and that of growing alfalfa took its place. Fifty yards farther on there came the smell of burning wood — indicative of man's dwelling — then the odor of willows. It was not the variety that surprised but

the clear vividness of each odor as set off from all others that arrested the attention.

And one may be on the desert a whole year and never have his senses assailed with the vile odors that are the peculiar property of cities. Decaying garbage, the musty smell of shut-in rooms, the awful air of closed-up churches, the polluted, "gassy," earth smells when the streets are dug into for repairs to gas-mains, etc., the thousand and one smells and stinks and abominations to the olfactory senses of civilization are never present on the desert. I am willing to endure the primitive conditions in order to be free from these apparently necessary adjuncts of our civilized life, for in the one are health and life and in the other are disease and death.

There is another phase, too, of the odors of the desert that must not be overlooked. Whatever the doctors or scientists say of them, there can be no question but that the odors distilled by the sun from the numberless sages and other desert plants have a distinctly soothing and healing influence upon all people suffering from pulmonary or bronchial difficulties. To be slowly suffocating through the cruel action of dread disease and then to come here and find relief, find the lungs beginning to expand again, the closed passages opening, the blood beginning to circulate again, this is to experience a delightful surprise. And it is one that never fails if the sufferer comes early enough and is willing to place himself wisely under these beneficent desert influences.

The colors of the desert are a never-ending source of delightful surprise. Here where I sit in the shade of a house, in March, 1906, at a little after five in the afternoon, the southeastern extension of the San Bernardino range and the Chocolate Mountains are before me. Such a mass of glowing color is never witnessed away from the desert. No artist could reproduce it. Its glow is too vivid and fiery. The hills themselves are apparently devoid of all verdure, and seem, from here, as if made of varicolored clays,—the predominant tints being reddish gray, a light sage-green, olive, and brick-red. At the extreme end of these hills, which are gradually diminished in height, is the Chocolate range, so named from its vivid color. As one looks at the lighter and

lower hills in front of the darker it is hard to believe that the difference is a real one of color. It seems as if it must be that the eastern range is in shadow, while the foot-hills are in brilliant sunshine. To the left stretching far away to the north and northwest the San Bernardino range grows darker and less brilliant, and the snow-cap of the giant San Gorgonio is hidden in the haze of the sky. Another day it will stand out as vividly and distinctly as if but a mile or two away, and every canyon in the seamed and rugged slopes will be as clearly discernible as are the foot-hills just before me this afternoon.

Yuma woman

And so it is every day. The mountains are a never-ending source of surprise in the delightful color changes they offer.

Then the sunrises and sunsets and the various colored sand, and the glistening efflorescence of the salt, the various greens of the trees, from the light pea-green of the cottonwood and willows to the olive-greens of the mesquite and the greenish Vandyke browns of the mistletoe,—these are to be seen nowhere else in the world as they are on the Colorado Desert.

Now, half an hour later, the hills have lost their glow,—they are in shadow. A far-away summit is glorious in a bath of liquid peach bloom, the Chocolate range is sublimated into liquid rose-madder, shading down to vivid purple, while a range in the far distant east is bathed in every shade of red, from a tender blush rose to a deep and fiery glow.

For a few hours our eyes and senses rest. We go indoors to eat and in the pleasures of the table forget for a while the subtler joys of sight. Then we step out of doors again to enjoy the cool of evening, and in one great, wonderful moment our very souls are flooded with a new and delicious sensation. The moon has arisen. Its soft, silvery tide has flowed over everything and there are no longer any harsh mountains, any barren, desolate desert. All is sublimated, transfused into a dream of calm, quiet, alluring beauty, that seems to steal into one's being through every sense

avenue. Nostrils, ears, touch, the pores of the skin, as well as eyes, take their dole of the prodigal wealth scattered broadcast from nadir to zenith and which has left nothing of earth untouched, and the soul itself seems to gently fall into a delicious restfulness that is a foretaste of the peace of heaven.

A perennial source of surprise even to the desert habitant are the marvelous varieties and the peculiarities of the tree and plant life: the palo verde, that wonderful prickly "green stick" tree, which has no leaves, only thorns, and yet which blossoms out in season into a gold more rich and gorgeous than Solomon's temple robes; the smoke tree that, from a casual look, may readily be taken for the ascending smoke from a camper's fire; the mesquite, full of thorns, laden with mistletoe of richest browns and

The smoke tree (Dalea spinosa)

greens and reds, and that also has a wealth of blossoms; the thousand and one varieties of cactus, each possessing its own colors; the creosote bush everywhere present, and in the late winter one of the most beautiful shrubs I have ever seen, clothed in a rich, waxy, deep green, enlivened with its yellow blossoms and pure white, fluffy, cotton-like seed pods. Then the desert willow, that anomaly of desert plants, — a water plant residing on the desert, — with its soft green leaves and its beautiful flowers, what a surprise it is! To be riding up a narrow canyon with bare walls of solid and ragged rock on each side of you, a few shrubs and plants scattered here and there on the "floor" of the canyon as you journey, and then, suddenly, to find a rich green tree, covered with beautiful white, pink, and purple blossoms,

is like meeting a desert friend in the crowded streets of a city of high walls and hot stones.

I have often wished I had been present to observe the surprise and delight that must have come over the first European traveler who discovered the palms of the desert. How he must have thrilled! Even to-day I never catch sight of the groves in the foot-hills to the northeast of Indio, and see the stately fringed leaves swaying and tossing in the breeze, but a sensation comes over me as if I had suddenly been picked up in an air chariot and whirled away to some new land. Then, when one finds them in the canyons, and, stranger still, right out in the heart of the desert, he begins to feel an affection for them that, once rooted in one's heart, can never be effaced.

Another great surprise connected with the plant life of the desert is the way in which the flowers and Bermuda grass come up after the rains. There will be no indication of either literally for years, — neither a flower nor a blade of grass. Then, suddenly, a shower will come, and as if by magic flowers and grass appear. Where have the seeds been all these quiescent years? What has preserved them? How have they retained their vitality?

Of the wealth of the desert flowers I have written elsewhere, as also of the marvelous growths of planted trees and fruiting plants. The way gardens and orchards spring up when intelligence guides their planting and the proper handling of the soil and water in irrigation form the subject of a complete chapter, and yet even there not a hundredth part of the story is told. From the wild plants of the desert that seem to be bleached by the heat of the tropical sun, to the rich green of a fig tree and vine, each of which I have seen bearing, the first in the second year after planting, and the latter *three months* after, the whole of the verdant life of the desert is a matter of surprise, and the more you know of it the more wonderful does it become. Think of vast crops of Bermuda onions, sweet potatoes, oranges, grapes, figs, pomegranates, almonds, dewberries, strawberries, and *car-loads* of watermelons and Rocky Ford cantaloupes being shipped from the desert. Look at the groves of date-palms rapidly coming to maturity and telling of the time when the whole United States will be sup-

plied with this rich and delicious table delicacy from this region alone and then ask of the desert, "Is not this a surprise?"

Nor is this all! The speed with which trees and plants mature and the early ripening of the fruit are never-ending sources of surprise even to me, who, ere this, I suppose should have learned to get over being surprised. But to see fig trees three years old that are as large as trees elsewhere would be accounted large after ten years' growth, and to see grape-vines, planted as cuttings, at three months old bearing bunches of grapes weighing two and three pounds still affect me with great surprise each time I witness them.

An artesian well on the desert

And the greatest wonder of it all is the presence of the one indispensable thing that makes it possible,—water. A few years ago water was scarcely to be found on the desert. Then the railway bored a well. That one boring changed the whole character of a part of the desert as by magic. It was a flowing artesian well. Since then scores of such wells have been bored and all throughout the Coachella Valley, down as far as the Salton Sea, millions of gallons are flowing away unused. Boston, Washington, New York City, with all their wealth, do not enjoy such a marvelous flow of water as does this part of the "desert."

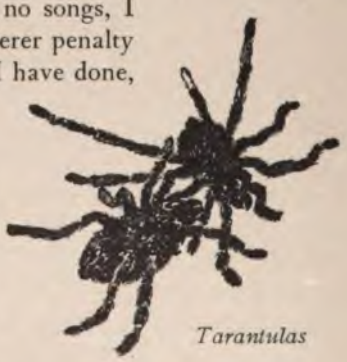
Of course I remember that in the canyons and elsewhere there

were hot and cold springs, but these, strange though they were, excited not a thousandth part of the surprise that the ordinary observer experiences when, for the first time, he realizes the vast flow of water the artesian wells of the desert afford.

Yet, on the other hand, is not this surprise in itself a source of surprise? Why should there not be vast quantities of water underlying the desert? With Mounts San Jacinto, San Bernardino, and San Gorgonio close at hand, all of them covered with snow throughout the whole year and thus acting as feeders of inexhaustible underground reservoirs, it would be surprising indeed if none of this found its way into the bottom of the desert bowl by their side.

Chuckwalla with banded tail

With water outflowing in half a thousand wells and producing richest verdure and sweetest fruits one might naturally expect a large number of birds, and yet their presence is a never-ending surprise. In number of varieties, and the sweetness of their songs, even the ornithologist is surprised. As for the *intelligent (?)* Eastern observers who go away and spread abroad the false report that the birds of California have no songs, I should like to award them no severer penalty than to compel them to listen, as I have done, to the bubbling fountain of song that wells up from our desert mocking-birds, the "pip, pip, pip," of the quail, the gentle piping of the canyon wren, the sweet singing of the linnets, the "fine careless rapture" of the meadow larks, the fairy notes of the humming-birds, the saucy scolding of the jays, and the harsh call of the bluebirds,— all of which may be heard in one day on the Colorado Desert.

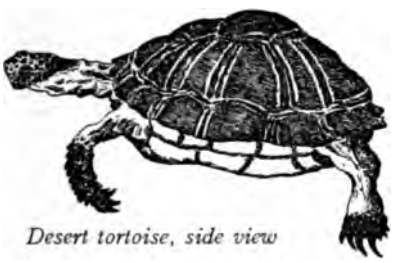


Tarantulas

Nor does this take into account the vast numbers of aquatic birds found on the flats of the Colorado River and the Salton Sea,

the millions of ducks, geese, herons, cranes, swans, and pelicans, none of which one would expect to find in such a desert region.

The animal life of the desert, too, affords one plenty of surprises, for not only are there the coyote, the fox, the badger, the gopher, the chipmunk, the wildcat and the field-mouse, but we find the cunning trade rat that takes away from one's residence some article, but always leaves a stick for each object taken (hence his name), the antelope, the deer, the mountain sheep or bighorn, — which is growing more scarce each year in the United States, — and the brave and powerful mountain lion. Add to these the various reptiles, such as the gila monster, the rattlesnake, the side-winder, the chuckwalla, the lizard, the desert tortoise, and the horned toad, and such insects as the tarantula, the scorpion, the centipede, and a score of other strange "bugs" that now and again catch the eye, and one feels that in the animal life alone he has enough for the study of a lifetime.



Desert tortoise, side view

To say that one might step out from his back door and in a few minutes pick up in his hands twenty-two fine, large, edible fish would be regarded as a surprising statement for any locality. But when it is asserted of the heart of the Colorado Desert it becomes almost unbelievable. Yet it is literally true. On the last Saturday of March, 1906, a rancher near Mecca actually picked up twenty-two fish, one of which I took to Professor C. F. Holder of Pasadena for identification. I account for the presence of these fish as follows: During the outpouring of the Colorado River into the old Alamo channel many of the fish of the river found their way into the Salton Sea. In March of 1906, the rainfall in the San Bernardino Mountains being excessive, the

Horned toad (Phrynosoma platyrhino, GIRARD)

lower portion of the Whitewater River carried quite a stream to the Salton Sea. The fish, coming in contact with the purer, colder water of the Whitewater, naturally followed it and thus, when the unusual flow subsided, they were caught in a natural trap, caused by a pocket in the stream which retained water after the course elsewhere had dried out.

One of the young men of the household, out shooting rats, mice, gophers, etc., at dusk, heard a peculiar noise in the bushes behind him, and seeing nothing, on hearing it again fired blindly in the direction of the noise. In the dim light he could find nothing that he had shot, but going to the spot the next morning he found three fish killed by his gun. Thus the presence of the fish was discovered and the other twenty-two captured.

The Indians are full of surprises. To see them hard working,—men and women alike,—self-respecting, sober, diligent, attentive to their own business, reverent churchgoers, faithful husbands and wives, loving parents, dutiful children, respectful citizens, some of them first-class farmers, good mechanics, and skilled laborers, and the women fine basket-makers, is to be filled with surprise. Then when one hears them tell their folk-lore stories, sees them in their fire-dance, listens to their songs of creation, a single rendition of which requires three all-night sessions, his surprise is increased to wonder.

An Indian "kish" with granary on roof

I suppose I ought not to be surprised at the Salton Sea, yet it is one of the most wonderful things the whole desert presents to me. Each time I see it, and every day I am upon it, or travel on its shores, or see it from the far-away mountains, it awakens the deepest emotions of surprise. A sea upon the desert! A sea in the heart of a blistering, scorching region of sand! Who can help being surprised, if his brain is habituated to thought? The wonder of it! The strangeness of it! The beauty of it! The majesty of it! The novelty of it!

It is all very well to account for its existence (as I have most

clearly done in the chapter devoted to the subject), but none the less the wonder and surprise remain. It is an anomaly, a physiographic anachronism, unexpected and for which the mind will not be prepared, and to which it will not become accustomed. And how glad I am that there are some things to which I cannot become blasé. To keep one's emotions and sensations of body, mind, and soul alert and awake, sensitive and receptive, is to live, and to live abundantly. May I ever be kept from the mental attitude that refuses to be surprised, that declines to yield to wonder, that regards enthusiasm and emotion with disfavor.

One never gets over the clarity of the atmosphere of the desert, its purity and, better than all, its healing quality to those whose lungs or bronchial tubes are diseased. The healing power of the desert is one of its happy surprises. To see a man of mental power and activity, capable of long and continued service to his fellow man, anxious to work, well equipped for it in every way, smitten by disease and in a few short months brought to a state of physical emaciation and exhaustion, mental inertness and spiritual quiescence, is to be filled with sadness and sometimes with despair. But to see this poor, decrepit creature, with one foot apparently in the grave, and the other rapidly following its fellow, brought upon the desert, and there wrapped around day and night with the healing power of the sun-laden atmosphere, subject to the direct vivification of sun, wind, and dry air, and then to watch his sure recovery to health, strength, courage, power, and usefulness, — this is to rejoice and be glad; this is to glorify God for this His wonder garden of health. And I have seen this so often in the past twenty-five years; I myself have shared in its joys. Is it not a surprise to enjoy, to see the dying brought back to life, to see despair driven back by renewed courage, to hear the lamentations of friends change to rejoicings, and then to catch echoes from the great outside world of business, literature, art, science, and statesmanship of the manly work done by those who but a few short months before were brought to the desert as almost ready for their graves? Yes, indeed, the wonderful restorations to health are among the greatest and most-to-be-desired of the surprises of the desert, and they will grow in number and power as the friends of the sick learn to send their ailing loved

ones *earlier* to this place of recuperation, renewed strength, and new life.

In concluding this necessarily hasty and cursory survey of some of the surprises of the desert it seems to me that one of the greatest surprises of all is the ignorance of well-informed people that the desert contains so many surprises. Yes, critic, I see the Hibernianism of the remark, but I am willing to let it go. We are a mentally alert nation in some lines, yet in others we are asleep and inert. The desert has been here for ages, was here waiting for us to know and understand when we first took possession of it. Why have we so neglected it, so flouted it, so steadily refused to cultivate its acquaintance? Is it to the honor of any man that he refuses the acquaintance of one who quietly and calmly offers him every opportunity for personal association, and who later, by another, is discovered to be most worthy, noble, and exalted?

The desert is the friend of man. It is full to overflowing of blessings. It is no mere fiction to call it "the Garden of Allah." To you, my dear reader, it calls and says: "Come to me, know me, lean on my heart, and you shall gain new power, strength, courage, and wisdom. You shall learn, as never before, the way of life."

Idyllwild, in San Jacinto Mountains

CHAPTER IV

The Rivers of the Desert

THE chief river of the desert is the Colorado. Though I do not forget the wonderful interest caused by the explorations of Major J. W. Powell, which made the Grand Canyon system of the Colorado River known to the world, I venture the assertion that never before has the interest of man been so centered on the Colorado River as it is to-day. The government is spending hundreds of thousands of dollars in constructing the Laguna Dam, a few miles above Yuma, which is to supply water for irrigation to thousands of acres in Arizona. The California Development Company, five years ago, cut into its banks on the California side, diverted water into the old channel of the Alamo River, and conveyed it to the so-called Imperial Valley (a portion of the Colorado Desert below sea-level), poured it into scores of miles of canals and thus distributed it to thousands of acres of thirsty lands which merely awaited its coming to blossom as the rose and produce with marvelous fecundity, and thus give homes to nearly twelve thousand people, with room for hundreds of thousands more. Owing to careless construction in the head-gate of this irrigation system, which caused the silting up of the canal and a consequent shortage of water, another harmless-looking cut was made in the Colorado's bank, below the Mexican line, in 1905, and surprised by unexpected floods this small cut has widened until it is now nearly a mile across, and through it is pouring the whole of the waters of the Colorado, gathered in Utah, Wyoming, Colorado, New Mexico, Nevada, Arizona, and California, so that the bed of the river below this cut to the Gulf of California, a distance of some one hundred and thirty-five miles, is as dry as a board. And this water, un-

tamed and uncontrolled, has remade two almost forgotten rivers, the New and the Alamo; has partially washed away two towns, Mexicali and Calexico; has entirely flooded and destroyed the town and salt-works of Salton; has refilled the sink of the Salton until it is now an inland sea, nearly fifty miles long, and five to twenty miles wide; has flooded and carried away forty miles of the track of the Southern Pacific railway, compelling the complete abandonment and rebuilding on a higher level of that distance of railway; and is now threatening (at this present moment of writing, July 9, 1906) the recently moved tracks so that engineers are determining where they shall be placed if the inpouring of the waters cannot be stopped. The unusual continuance of flood waters in the Colorado has been Nature's positive refusal to allow man — the most competent and skilled that money and science can command — to fill up the once harmless-looking cut in the Colorado bank, so that boards of noted engineers of the United States, Mexico, Southern Pacific, California Development Company and others, officially and unofficially, have gravely studied the matter as one of international and, indeed, world-wide importance.

These, then, are some of the reasons for the wide-spread interest in the Colorado River, the Nile of America, altogether leaving out of consideration the fact that if the flood does not cease the twelve thousand inhabitants of the Imperial Valley, with their orchards, farms, ranches, and stock ranges and their towns of Imperial, Brawley, Calexico, Mexicali, Holtville, Heber, El Centro, and Silsbee and the towns of Mecca, Thermal, Coachella, and Indio, with the Indian villages of Martinez, Agua Dulce, and Torres in the Coachella Valley will be submerged as was Pharaoh's army in the Red Sea.

With these facts and fears connected with it there is no wonder that the Colorado River is now the most observed river of the world.

Of the history of the discovery of the river by Alarçon from the Gulf of California, and Cardenas from the rim of the Grand Canyon, the explorations of Padre Garcés, Hardy, and Ives, the adventures upon it of trappers and prospectors, the scientific and determinative explorations of Powell and Stanton, and the

latter-day navigations of it by Captains Polhamus and Mellen, I have not now space to write.

Elsewhere I have shown how it has been the carrier of all the sand and silt that have made the Mohave and Colorado Deserts, and how it is now filling up the Gulf of California so that, in ages yet to come, new deserts will appear where now tides and bores play havoc with the sand-bars and help distribute them to make way for more.

It is an uncertain river, is the Colorado. Generally it runs quietly and sluggishly through the desert from about the end of July to the end of November, when the winter rains begin. After a month or two of higher

The author's boat

water, it sinks back again to a low level until about the middle of May when the snows begin to melt in the far-away mountains where the winds have carried the moisture during the winter. Then for over two months (as a rule) the sleepy, sluggish giant is roused to an activity that is demoniac in its power and blind, undirected, uncontrollable fury.

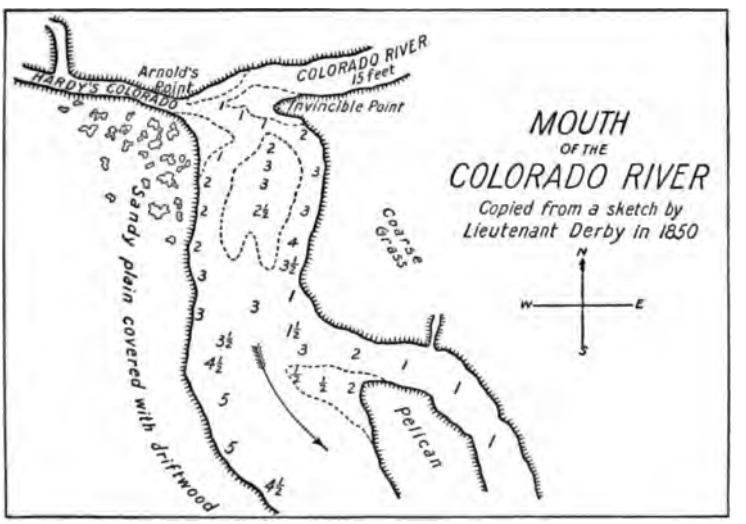
Few rivers have such a life-history as the Colorado. Rising in the snowy peaks of the mountains, the trickling rivulets of the purest water of earth, distilled from perpetual snow-banks, unite to form rills; these in turn unite and make rivulets; the rivulets unite and form the creeks that empty into small Alpine lakes.

There are two rivers that join to form the Colorado,— the Grand and the Green. The sources of the Grand are in these Alpine lakes five or six miles west of Long's Peak. As the small creeks pour their waters into the lakes, they overflow and discharge into a common reservoir known as Grand Lake. Towering cliffs and crags of granite mark its eastern shore, and stately pines and firs occupy its western margin, all of which are reflected on its pure and placid surface.

Green River heads in the Wind River Mountains of Wyoming, near Fremont's Peak. Small Alpine lakes by the thousand contribute each its quota to Green River, which being larger than the Grand is regarded as the upper continuation of the Colorado. The source of the Grand is in latitude 40° 17′ and longitude 105° 43′ approximately. The source of the Green is in latitude 43° 15′ and longitude 109° 54′ approximately. The mouth of the Colorado is in latitude 31° 53′ and longitude 115°. From the source of the Green to the mouth of the Colorado it is two thousand miles. The area drained by the Colorado is about eight hundred miles long and varies in width from two hundred to five hundred miles. It contains about three hundred thousand square miles, a territory larger than all the New England and Middle States with Maryland, Virginia, and West Virginia added, or nearly as large as the five great states of Minnesota, Wisconsin, Iowa, Illinois, and Missouri combined.

More than two-thirds of the length of the Colorado and Green Rivers pass through a mountainous or plateau region where the water is as pure and sweet and fresh as mountain snow water generally is. From under the snow it flows; then over the rocks, jumping, splashing, sparkling, murmuring and "guggling" like a happy child. Now in the form of rapids, then in cascades, or falls, churned and dashed into foam, or flowing along in smooth, rocky channels with nothing but gentle lappings and sighings, sung over by the lark, vireo, linnet, and sparrow, and bathed in by the little folk of the earth and air, watched over by sweet-scented roses and larkspur and lilies, and shaded by the beautiful foliaged poplars, quaking aspens, sycamores, alders, and cotton-woods, it flows merrily and laughingly along. New streams add their pellucid waters to it and it grows in power and volume

until it is a river of size and power, a stream of dignity and appearance. Then it enters the canyon region, where it has its own definite waterway cut by the corrasion, erosion, and battlings of the centuries into massive cliffs that are the wonder and admiration of the world. Flaming Gorge, Horseshoe Canyon, Kingfisher Canyon, Canyon of Lodore, Echo Canyon, Whirlpool Canyon, Split Mountain Canyon, Canyon of Desolation, Gray Canyon, Labyrinth Canyon, Stillwater Canyon, Cataract Canyon, Gypsum Canyon, Narrow Canyon, Glen Canyon, and



Marble Canyon are names which suggest the pathway of the river before the Grand Canyon is reached. Of the Grand Canyon I have elsewhere written fully.[1] It is confessedly the most stupendous and awe-inspiring piece of natural scenery now known to man.

Below the Grand Canyon, which terminates at the Grand Wash, there are Iceberg Canyon, Virgin Canyon, Boulder Canyon, Black Canyon, Painted Canyon, and Pyramid Canyon before

[1] In and Around the Grand Canyon of the Colorado River in Arizona, 346 pages, 100 illustrations.

the river enters the desert portion of its pathway just above Fort Mohave. And what a change is here! During all these miles of canyon travel the river has been the most impetuous, unrestrained, untamable, and powerful of American rivers. It has dashed noisily along — not rolled but *dashed* along with irresistible force, over roaring rapids and long cascades, with clash and roar keeping up its ceaseless warfare against the rocks that enslave and confine it. For centuries the battle has raged,— a conflict never at rest for a moment. Though whipped into foam, dashed into bubbles, churned into froth, splashed into yeast and shattered into mist, it has kept up its leaping, beating, striking, and worrying, cutting into and undermining the cliffs and springing upon them with incalculable power and fury when, broken and shattered, they fell into the trough below. Ah! what battles the sun and moon have witnessed as, in their silent and stately marches, they have looked down over this region of canyon and gorge.

Then the mountains to the north burst forth with melted torrents of fiery lava which flowed to the side of the canyon and over into the trough where a new conflict began. Water and molten rock! What a struggle; what a seething and boiling and hissing! But the river won. It was not to be defeated. The fiery lava was changed into cold stone, and pillars and coatings of it now stand and line the canyon walls while the unconquered and unconquerable river still rolls on as it has done for countless centuries.

Now the end of its warfare has come. It has reached the desert. There are no more rocks to battle with. It has demonstrated its supremacy. It is growing old. So like a lazy giant it stretches, and sprawls, and creeps sleepily along, heavily, sullenly, and so silently, that one might not know it were there did he not hear, now and again, the splash of a jumping fish or the boiling up of an undercurrent. Laden with silt and sand, caused by the grinding of the millions of tons of rock that have fallen into its canyon path, it moves heavily. Most of these rocks contain red oxidizations which have colored the water until it is a peculiar red, and *Colorado* means red. Though the old conquistadores named and renamed the river, Alarçon calling it the Rio de Buena Guia (the river of good guidance), from the

Viceroy Mendoza's motto; Diaz, the Rio del Tizon, from the habit of the natives of carrying about with them firebrands to keep themselves warm in the chill autumn air, it *was* and *is* the *Colorado*, because it *was* and *is* the Colorado, the red, both in walls and water. Whatever other colors are there the red predominates, twenty to one, hence no one can question the appropriateness of the name.

The sand and silt carried down are what have made the desert. Only such a river, with its origin at a tremendous elevation above its mouth, could have had the carrying capacity to bring down such a vast amount of deposit as has this river. When we watch the processes of man in removing earth,— the plow and the scraper being his implements, or even the steam shovel and the dredger, — and consider how slowly and on what a small scale he works, we begin to realize the gigantic power of natural forces. Nowhere are these more apparent than in the carrying ability of the waters of the Colorado. I have seen a mass of sand and silt over a mile long and from six to twelve feet high deposited in a few days during the flood season, and the following season I have seen it carried away in a few hours. Because it works silently and is generally sullen and still, it must not be thought powerless and always tractable and gentle. The engineers who, for over a year, have been trying to tame it below Yuma, have found out how mistaken such an idea is. One by one their efforts were demonstrated futile. Piles and steel cables, mats and brush filling, by the thousands of tons were whirled away as if in sport and derision. An island stood near the intake of the canal of the California Development Company less than six months ago. It was a mile long. The engineers tried to anchor one of their dams to it, but the river objected and began to cut away the island, and to-day not an inch of it remains. I have seen the engineers of the Santa Fé railway, near the Needles, with great gangs of men working day and night to prevent the river from cutting away the bluffs upon which their tracks ran, and that a month before one would have declared safe for a thousand years to come, and yet the engineers were driven back and trains were held up for ten, twenty, thirty, forty hours until the tracks could be removed and replaced.

It is a silent river, yet it has washed out bridges at Needles and Yuma and compelled both railway companies to seek places where their piers could be anchored deep in solid rock and cement, ere their new bridges could bid defiance to its power.

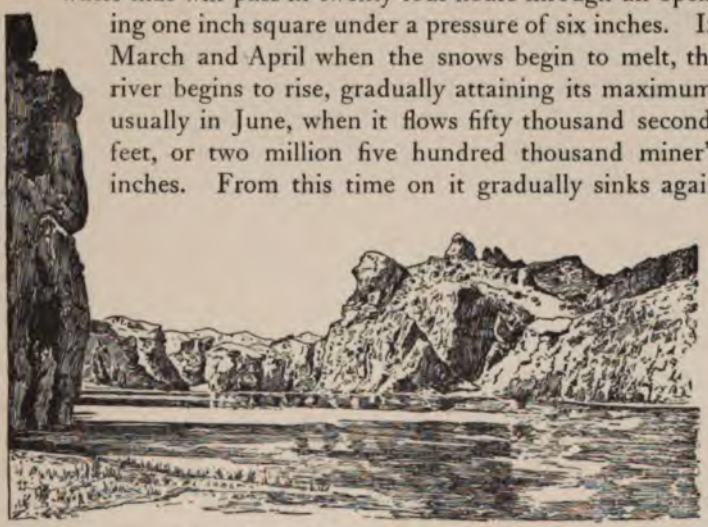
I have seen a monster steamer drift down with its current and on to the canal made by the overflow and in two hours travel about twenty miles. On its return journey it required ten hours of hard battling to make the same distance. When I rowed down from Needles to Yuma it took me fifteen days (eight or ten only of which were spent actually on the river), but in flood time the three hundred miles have been made in a day and a half. So that even its silence and laziness now that it is out in the open of the desert cannot be depended upon. Indeed there is but one thing in which it can be depended upon, and that is its wilfulness and undependableness.

Yuma Indian using metate

Even to its dusky children, the Yumas and Mohaves and Cocopahs, it is, at times, a very cruel stepfather. Time and again it has washed over their whole reservation, as it did in 1905 and 1906, flooding almost every "kan" of the Yumas, and compelling them to flee to the high ground for safety. Levees to prevent it are almost useless, for, if it takes a mind to it, in a few hours it will cut away the whole country on which the levees are built. The inhabitants of Calexico and Mexicali found that out during their critical time in June and July, 1906, when the river, running in wild flood down the Alamo and New Rivers to the Salton Sea, began to cut into their towns. They used dynamite to cut out a passage for the mad waters and tried to prevail upon them to flow in it, and for a while all was well, and then, suddenly, the river took a destructive streak and began to attack the bank near the town of Mexicali and in a few hours half a street of

houses tumbled into its turbulent flood, were crushed and crumbled to pieces as if in derision and scoffing, and in a few minutes had disappeared forever.

We have seen that the flow of water in the Colorado is a most variable quantity. From about September first to March first of each year while the snow is frozen on the mountains, except for occasional floods, the river is low, reaching a minimum flow of about four thousand second-feet, or two hundred thousand miner's inches, during that time. A miner's inch is the amount of water that will pass in twenty-four hours through an opening one inch square under a pressure of six inches. In March and April when the snows begin to melt, the river begins to rise, gradually attaining its maximum, usually in June, when it flows fifty thousand second-feet, or two million five hundred thousand miner's inches. From this time on it gradually sinks again



Colorado River below Needles Bridge

to a slow stage in August and September. From time to time throughout the year, especially in the summer months, the river is subject to sudden small rises originating in torrential downpours on the Arizona watershed, but the manner and character of these floods distinguish them from the main flow.

So long as the Colorado River was regarded merely as a river, a factor in the landscape, a natural feature incapable of serving man except as a means of transportation and pleasure, the amount of sediment it contained and its character were of no great moment. But when it was determined to rob the river of some of its flow

and divert it upon the land for purposes of irrigation it became a matter of great importance to determine these things. For upon the amount of sediment it carried many engineering calculations had to be based, and upon the quality of the salts and silts largely rested the life of the irrigated district. It has been found by expensive experience that waters containing too large a proportion of common salt and the sulphates of sodium, potassium, and magnesium render the lands they irrigate useless. To determine these matters, therefore, in regard to the Colorado (and other Arizona streams), the Arizona Experiment Station, in 1899, began regularly sampling its waters. The method of sampling is interesting. A stoppered tin cylinder, thirteen inches long, two inches in diameter, and holding about one and one-half pounds of water, was slung in a wooden support having a handle by means of which it was submerged in the river, from six inches to a foot below the surface and with its mouth upstream. The rubber stopper was then pulled out by means of a cord or wire, and as soon as the cylinder was filled it was withdrawn from the river and instantly emptied into a demijohn. A number of daily samples so taken were combined and the testing of them took place at the chemical laboratory.

Owing to its great length and the rocky canyons through which the upper two-thirds of its flow occurs the amount of sediment contained in the Colorado is far more constant than it is in such rivers as the Bill Williams, the Salt and the Gila which receive the run-off of watersheds subject to torrential rains. These severe rains sweep the floor of the desert regions through which they pass and, at such flood times, largely determine the physical character of the main river's sedimentation. The sediments that are the result of canyon erosion form a dense mud, reddish gray in color. These come in April, May, and June. When the summer floods come from such tributaries as the San Juan, the Colorado Chiquito (the little Colorado), and the Havasu the yellow and red colors predominate, while, when the flood waters from the Gila predominate, the Colorado below Yuma sometimes becomes repulsively black.

Conservative estimates show that in 1900 the Colorado River brought down not less than sixty-one million tons of silt which,

condensed into solid rock, is enough to cover twenty-six and four-tenths square miles a foot deep; or to make fifty-three square miles of dry, alluvial soil one foot deep; or to make about one hundred and sixty-four square miles of recently settled, submerged mud one foot deep, reckoning the whole amount of mud for the year to average six and two-tenths times the bulk of the solid sediment.

In 1903 and 1904 (September to August inclusive), ninety-five million tons of sediment were carried by the river past Yuma, and this did not include the sand pushed along the bottom. One day alone, when the Gila had poured a muddy flood into the Colorado, one million eight hundred tons were carried by. It will be seen, therefore, that this year far exceeded that of 1900. The sediment of 1903 and 1904 would have made a mud bar ten feet deep and approximately twenty-five square miles in extent; or about eighty square miles of dry, agricultural soil one foot deep.

With such facts, clearly demonstrable, before us, can we wonder at the reach of the imagination which sees in the Colorado Desert sands the changed rocks of thousands of feet of plateau region strata, and that pictures for the future the Gulf of California converted into land, irrigated by the continuing waters of the Colorado River which conveyed the land to its present situation, and thus made the home of thousands of happy, contented, and prosperous people? Indeed, to demonstrate the possibility of such a thing becoming an actuality it may be stated that the boatmen of the Colorado River familiar with conditions at the gulf assert that during the past forty years the Colorado has advanced some fifteen miles into the gulf.

The amount and weight of these sediments occasionally produce unexpected and tragic results. Poor Pete Maguire, blind through cataract, finding his boat drifting away from the bank, owing to his companion's carelessness, jumped into the river intending to swim ashore. But so heavy was the sediment that it weighted him down and before help could reach him he was drowned.

The fertilizing value of the sediments lies mainly in the amount of nitrogen they contain, though potash and phosphoric acid are also present. Few rivers contain so large a quantity of the

valuable nitrogen. In this particular the Colorado is analogous to the Nile. Its salts, too, have a decided value in neutralizing the sodium carbonates of black alkaline lands.

Thus beneficent Nature works good in two ways. The irrigable areas of the desert contain large spots of alkaline lands which, flooded with these Colorado River waters, are leached out, while the deposition of the nitrogenous elements in the sediments adds needed factors of nutriment.

Of my own trip down the Colorado River from the Needles to Yuma, alone, a few years ago, I cannot here write, nor of the wonders of the river below Yuma.

There are other rivers on the desert as well as the Colorado. I know the look of credulity that will come over the faces of many as they read this statement. Yet I repeat it. There are the Alamo, the New, the Whitewater, the Carrizo, and the Mecaroni. Strange rivers, indeed, all of them, yet rivers of importance and interest, and were they not strange they would scarcely be appropriate to the desert and harmonious with the other objects found there.

THE ALAMO RIVER

The Alamo is a prehistoric river, with a history of intermittent flow, and now, in part, almost as large and important as the Colorado. In prehistoric times it was the connecting link between the Colorado and the Salton Sea. Elsewhere I have shown that for a long period after the Salton region was cut off from the Gulf of California it must have been a fresh-water lake. The source of its water was the Colorado River, and if the whole of the flow of the Colorado entered the Salton Basin then the channel we know as the Alamo was the Colorado River of that day. It is by no means as unreasonable as it may seem to assume that the whole of the Colorado River once flowed into the Salton. When the natural alluvial dam was thrown up by the Colorado's flood waters it may be possible that the dam was on the lower or gulf side of the flow and that the river thus emptied itself into the basin above the dam. Or it is possible to conceive that the river flowed into the gulf after the natural dam was made, and that long after the evaporation of the isolated gulf waters had

taken place, another flood broke a channel through the dam and thus allowed the filling up of the basin again with the fresh water of the Colorado. The channel by which this was effected was the Alamo.

In historic times there has been no constant flow in the banks of the Alamo except, as I shall shortly relate, within the past five years. Only when the Colorado overflowed could the Alamo be called a river, and then its dignity as such was lost in the course of a few days, or as soon as the flood subsided. During the Sonoranian emigration in 1849 and 1850 and the later years of the gold excitement we often find references to the joy of the weary travelers in finding a stream where they did not expect it. This applied to both the Alamo and the New, which had a similar history. As the overflow ceased the water in the channel of the Alamo subsided, but, as some portions of it were deeper than others, lagoons would be formed, which remained until their waters were carried away by evaporation.. These lagoons are a frequent source of happy comment in the narratives of the gold seekers.

When the engineers of the California Development Company made their preliminary surveys in order to determine how they could best convey the waters of the Colorado River for irrigation purposes into the Imperial Valley, they discovered this old Alamo channel. I say "discovered it" advisedly. They learned for the first time its complete course and found that it connected with the Salton Basin. Here then was a channel already made, the lower end of which would serve as a main canal to convey water to the region to be irrigated, and the upper end of which would act as a channel through which waste waters could be conveyed to the Salton Basin. When the system was installed the Alamo was thus utilized. As far as Sharps — seven miles east of Calexico — it became the "main canal." There head-gates were put in which diverted the water to the distributing canals, and what was not needed was allowed to enter the upper channel of the Alamo and flow to the Salton.

When, in 1905, the upper part of the cut canal leading into the Alamo from the Colorado River was found to be silted up, and Mr. C. R. Rockwood cut the small channel from the Colorado,

below the silted-up canal, to allow the water to flow and thus save the farmers of the Imperial Valley from ruin, he became the instrument of fate in permitting the people of this day and generation to see what nature itself had done in prehistoric times, and had then abandoned. For, as is well known, owing to unusual floods, the whole of the flow of the Colorado was soon diverted through this cut into the Alamo channel, and for several months and at this present time of writing (July, 1906) there is no Colorado River below the lower intake, as the whole of its waters are running by way of the Alamo to the Salton Sea.

But a change will doubtless soon be made. The dam will be constructed across the cut, the head-gates are already in place, and ere this book is in the hands of the public I confidently expect to see the Colorado restored to its old, that is, its *recent* historic channel, and then the Alamo will once again be changed from its estate as a great river flowing independent of the will of man, working great injury to his schemes and plans, and made subservient to that will as an irrigation canal, conveying water under his control for the beneficent purposes of sustaining life and promoting man's prosperity.

The story of my descent of the Alamo forms an independent and later chapter.

NEW RIVER

The first reference I can find to the "New River" is in Bartlett's Narrative of Explorations in 1850–53. Writing of his camp at Alamo Mocho he says: "About twenty-five miles back from this place we crossed a ravine or arroyo some twenty or thirty feet wide, and about ten feet below the surface of the desert, that forms the bed of what is known as 'New River.' Three or four years ago this ravine was filled with water, as well as a large basin connected with it. The water suddenly appeared here, and by passing emigrants was hailed as a miracle and direct interposition of Divine Providence, like the manna furnished to the Israelites of old. This phenomenon is now well known to proceed from the Colorado River, which some years rises to a great height, overflowing its banks and the adjacent valley, and sometimes running back through lagoons and depressions in the desert for many miles. It

was one of these great risings of the river that caused the sudden appearance of the mysterious 'New River' of the desert, which remained two years, and then dried up. By similar inundations the great basin at Alamo Mocho has doubtless been, and may again be filled. I was told by persons in California who had crossed the desert, that they had found pools of brackish water several miles from the road. These I presume to be deeper basins, where the water stands longer than in the 'New River' or the dry basins passed by us."

Another writer of about the same time asserts the belief that this New River had its source in a lake "which had bubbled up spontaneously."

We now know that the modern history of New River is very similar to that of the Alamo. It has its source, however, in Volcano Lake, a variable body of water in Lower California, some thirty-five miles southeast of Calexico. This lake receives water from the Colorado by means of the Rio Paredones, for, strange to say, this "tributary"— as it is often regarded — really "taps" the Colorado and conveys its waters to Volcano Lake. During flood seasons the Paredones not only supplies Volcano Lake, but spreads out over considerable country to the northward and contributes directly to New River.

Volcano Lake is situated on a divide of slight elevation so that, while some of its waters flow to the north by means of New River, the larger amount flows south as Hardy's Colorado and empties into the gulf.

This was the normal history of the New River until the advent of the California Development Company. The plans of this company required that two miles beyond where the Alamo discharged its waters into the main canal of the Imperial country, the main canal in turn should empty its surplusage into New River, which then conveyed it to the Salton Sea. From the map it will be seen that New River flows in a general northwesterly direction from Volcano Lake to Calexico and Cameron Lake, spreading out above Silsbee and spasmodically feeding the small marshy lagoons known as Blue, Diamond, Badger, and Pelican Lakes. Then curving around it strikes to the northeast up to near Brawley, where it irregularly parallels the Alamo River at about a mile

distance, and again curving to the northwest empties into the Salton Sea.

During the high flood season of 1906 New River got on the rampage and half wiped out of existence the town of Mexicali and for many days kept the inhabitants of Calexico on the anxious seat. While a large portion of the flood waters were turned into the upper Alamo at Sharps there was still a great flood that entered the main canal. In addition the north fork of the Rio Paredones was running full. There was still another channel by which the flood waters of the Colorado entered New River. On the map between Seven Wells and Sharps will be seen, on the south side of the Alamo, the outlet known as the Beltran Slough. This carries off considerable water when the flood is high, and though it scatters and "flows wild" over a large area of country, much of the water finally reaches New River. Here, then, were three sources conspiring to fill up the stream. Between Sharps and Calexico it cut into ranches and ate them up, converting the once fertile fields into scarred and gullied flood wastes. Two miles northwest of Calexico is Cameron Lake, and as the flood poured into it the bed of the river at the outfall began to "cut back." Higher and higher the river rose. Levees were built surrounding the towns, but the flood still rose and in some cases washed over them. On the thirteenth of June a stream was flowing through the railway depot at Calexico, the tank-house was an island, and the switch-bars arose above a turbid flood. Between the depot and the town a dike or levee was built on which whites and Indians worked, the former with the energy of desperation, the latter "like boys on the day the circus comes to town. They would just as soon rub sticks together or dip up water with a sieve — they pile sacks with just that much earnestness." Across from the railway track, looking toward the west, the river was fully seven miles wide.

For nearly a month this flood continued. Nearly five thousand dollars was spent on the levees of Mexicali and Calexico. Erelong the water stood against these to a height of four feet. About the twenty-sixth of June, when the river began to "cut back" from Cameron Lake, it was thought this would save the towns by deepening the channel and thus helping drain off the flood. In a few days this seemed to be accomplished, for the water against the levees was drawn off.

In forty-eight hours this rejoicing was changed to fear and dread. A small ripple appeared in the stream south and west of the Mexicali depot that grew rapidly. It soon became a channel and the water commenced cutting away the soil with a rapidity that was as astonishing as it was fearful. For in a few hours the foundations of the depot were washed away and the building itself floated off down stream.

The adjacent property became a prey to the devouring waters, and buildings which stood in its path were ruthlessly torn from their foundations and carried away. Then came a lull of thirty-six hours, during which dynamite was resorted to in an attempt to divert the channel.

While this work was progressing Nature was preparing for the carrying out of plans of her own. A storm that had been brooding over a section of country a thousand miles away at an unusual time of the year broke and sent its flood down the Colorado, into the Alamo, down the Beltran Slough and along the canal into the New River. The old channel was filled with a rapidity that was remarkable. Building after building succumbed to the action of the rushing waters, until it seemed that only the destruction of both towns would abate its fury.

Deeper and deeper the river cut and higher and higher grew the banks along its side. The men were unable to cope with the situation, although ton after ton of dynamite was used in an attempt to stay the destruction. Just as the water had washed away the first house of the group that remains in the town of Calexico, another change took place. The caving in of the banks became infrequent and then ceased.

The flood had subsided, and to-day, July 10, 1906, as I write, instead of a turbulent torrent of water rushing on its way to the Salton Sea, a stream about seven hundred feet wide and from ten to twenty feet deep flows past the towns, confined within banks thirty feet high and with a current of not more than six miles an hour.

As soon as the Colorado is returned to its original channel the flow in New River will become normal, — that is, it will be a small stream depending for its main supply of water from Volcano Lake and the surplusage from the main canal of the Imperial system.

THE WHITEWATER RIVER

Although one might travel over the desert many, many times and never see the Whitewater, it is nevertheless a most important *desert* stream. The qualifying adjective means much. A desert river may have as large a volume of water as an ordinary small Eastern river, but desert conditions are such that its largest volume may be underground. The Whitewater heads in the snow-banks and cienegas and springs of the San Bernardino Mountains and for a while flows almost west. It gives its name to the Whitewater Canyon, and also to the famous Whitewater Ranch in the San Gorgonio Pass. This ranch is now the property of the Bear Valley Water Company. It was once one of the stage stations, and many a weary traveler over the desert has almost wept with joy when his

The San Bernardino Mountains

eyes rested upon this exquisitely green oasis — the first seen since crossing the Colorado River. Even now, old prospectors who prefer to travel with their burros from the desert to civilization eagerly look forward to reaching the Whitewater Ranch. At Whitewater station, after a heavy rain, or when the snows begin to melt, the Whitewater appears as a veritable mountain torrent, dashing down with roar and clatter among, around, and over its boulder-strewn path. Then, impinging on one of the spurs of the San Jacinto range, it turns to the south and, hugging the western mountain bases until it passes about opposite to Indio, it turns to the southeast and flows into the Salton Basin.

It is a winter stream though it flows all the year in its upper reaches, growing less in volume as the summer advances. Below

Palm Springs, however, during the summer it has no exterior or apparent flow. It is, in truth, a buried river, forming in large part the great artesian water supply of the Coachella Valley.

Evidences of the shifting character of the lower flow of the Whitewater are found in several abandoned beds to the north and east. The shifting of the desert sands during seasons of drought where there was no flow in the river bed has forced it to the west and south.

In the winter of 1905–6 the Whitewater seemed to emulate its great desert brother, the Colorado. Its waters poured down, washed out the irrigation connections with Palm Springs, and dashed down over the Indio fields and roads to all the towns along the railway even as far as Mecca, washing out roads, bridges, and a few acres of land. It was at this flood time that the fish entered it from the Salton Sea as related in another chapter.

The Whitewater is the source of the irrigation water that has done so much to reclaim Palm Springs. There is a constant flow of some one thousand inches which might be utilized. But the ditches and conduits are not now in good condition; a Los Angeles bank holds a mortgage on them, and until energetic steps are taken to restore things to successful working order the priceless flow of the Whitewater runs to waste and the farms and gardens that should have it suffer from its loss.

CARRIZO CREEK

Bartlett says of Carrizo Creek that it is "one of those remarkable streams which sometimes spring up in desert regions. It rises in the very center of barrenness, flows for about a mile, and is again absorbed by the desert. It has worn for itself a bed about fifteen feet below the plain. It is from three to nine inches in depth, and varies from six feet to as many yards in width. Where the banks have been washed away it receives, in several places, accessions from springs; but when these cease, the stream grows less and less, until it is all absorbed by the sands."

THE MECCARONI RIVER

Water! How little city dwellers, who have a sufficiency of water, know what those five letters stand for on the desert. Noth-

ing is so precious as water; and yet, strange to say, on parts of the Colorado Desert water is not only running to waste, but is there in such abundance as to cause considerable trouble. Elsewhere I have shown the vast trouble and expense caused by the overflow of the Colorado River into the Desert Basin. At Mecca the artesian wells flow so freely and continuously that the reservoirs are all full, and at certain periods of the year the farmers do not know what to do with the water save let it run where it will. It breaks down the paltry ditch banks, overflows the roads and makes traveling most uncomfortable. Toward the southeast some of these stray waters gather together, forming a small creek which flows in an intermittent kind of way and finally empties itself in the Salton Sea. A local wag, well foreseeing in the laxity of pronunciation of his neighbors the degeneracy of the name he coined, termed it the Meccaroni River, and now it is seriously and unconsciously spoken of by every one as the Maccaroni River. At times it is quite a respectable-looking small stream, and until the land of the region is so cultivated that all the supply of water is needed, it will continue to flow into the Salton Basin.

A glimpse of San Jacinto Peak

CHAPTER V

The Mountains of the Desert

OUNTAINS on the desert constitute one of its chief charms, especially when to all their other sublimities they add the crowning glory of a cap of virgin snow. I shall never forget the varied emotions of pleasure, joy, and adoration that came over me early one morning as I got off the west-bound train at Mecca. The name itself, as the brakeman called it out, was suggestive of pilgrims, date-palms, heat, sand, and desert. The morning was crystalline in its clearness and cool enough to be deliciously stimulating to every nerve of the body. One breathed in the pure, vivifying air with delight and satisfaction. Walking over to camp the eyes instinctively followed the two ranges that shut in this desert basin, until they rested upon the towering mountains that sentinel the pass into the "Garden of Allah." Snow-crowned and pure they stood, solemn, calm, serene, immovable, — types of guardian spirits shedding beneficence on every hand.

I never look upon these mountains without recalling the story of the sentinel angel with the flaming sword placed at the Garden of Eden after the expulsion of the man and woman for their disobedience. That angel stood as a preventing spirit, — not revengeful, but punitive, — and typified, in the biblical story and in the old conceptions of Hebrew theology, the relentless justice of God that sent man forth into a world of sorrow and misery, of struggle and woe, of failure and despair, as well as of achievement and joy, because of his one act of disobedience.

Here, on the other hand, these two pure sentinel peaks invite one, lure one, not only to the serene and calm of the life of the desert, where civilization and its cruel strifes are almost

unknown, but they appeal also to the soul and bid it claim its own of purity, serenity, majesty, and peace.

Oh! blessed mountains of allurement, of suggestion, of provocation to the higher life, well worthy are you of the honored position you occupy — to stand at the gateway of the Garden of God.

In the west fork of Palm Canyon

On this March morning at Mecca the peaks were not only crowned with snow, but their shoulder robes were of ermine, composed of pure snow, and the deep green of the forests which at this distance looked perfectly black. Kissed by the early morning light, which gave a rosy glow to both masses, they shed a richness, a grandeur, a sublimity over the rest of the desert that glorified it. It requires no effort to worship at such a shrine. It becomes a mystic altar of marble-white approach, with piled-up, retreating terraces of color leading the eye to a grand choir of proud and heaven-aspiring pines, all surrounding the snowy fane of perfect purity. What wonder that rude and profane men are suddenly sobered and dignified by its swift effect when its majesty and beauty are suddenly revealed to them!

When you first look at the mountains they appear to be all alike, — big, brown, green, or red, rough and rugged, and that is all there is to say about them. But as you study them how astonishingly different they become in their outlines, shape, color, texture, and the material of which they are composed. And when the sun so shines that they become dimpled, then, indeed, there is no wonder that one is entranced by their bewitching beauty.

At sunset the mountain peaks are covered with a golden glory that no words can picture, and the whole of the western heavens are one exquisite blaze of color. Is this glory of the earth or of heaven? Each revelation of new splendor below seems to call forth a more perfect revelation from above. The mountains are more than matched by the sky, yet they become as comrades, not rivals, the one setting forth the rich splendor of the other. We seem to realize now as never before how that

"The emulous heaven yearned down, made effort to reach the earth,
As the earth had done her best, in my passion, to scale the sky."

Each was responsive to the emotion and movements of the other. Soon the stars came out in response to the invitation of the golden-tipped mountain spires, and the moon floated forth to caress the snowy crown. The palm trees waved their mysterious messages to the silvery clouds, which bore them away over the misty, dreamy purple of the far-away desert.

There are four supreme mountain peaks that belong to the Colorado Desert. These are San Gorgonio, San Bernardino, San Jacinto, and the Cuyamaca.

The two former are the chief peaks of the San Bernardino range. San Gorgonio has an elevation of 11,725 feet, and San Bernardino is about seven hundred feet lower.

San Jacinto is the chief peak of the range that bears its name. Its elevation is 10,805 feet.

The San Gorgonio Pass is 2,808 feet above sea-level. The general altitude of the San Bernardino and San Jacinto ranges where they enclose the desert is approximately 5,000 feet.

San Gorgonio Mountain is sometimes degraded by the name "Grayback," given to it by the early miners and trappers on account of its broad, flat back suggesting a louse. That thoughtful and dignified people should be willing to apply so degrading a name to so noble a peak is to me incomprehensible, except on the ground of indifference, or ignorance as to the sources of the nomenclature of these mountains. The names originally were given by the early Spanish settlers, at the time of the establishment of the Franciscan missions in California, and

lat· priestly and other explorers traversed the desert
ernardino is named after the saint of Clairvaux,
a o either after the Chamberlain of the Emperor
Troja noted Polish saint, who was a member of the
order ominic, and who lived A. D. 1257. San Gorgonio
(Saint G was named from the saint universally honored,
but generally known as the patron saint of England.

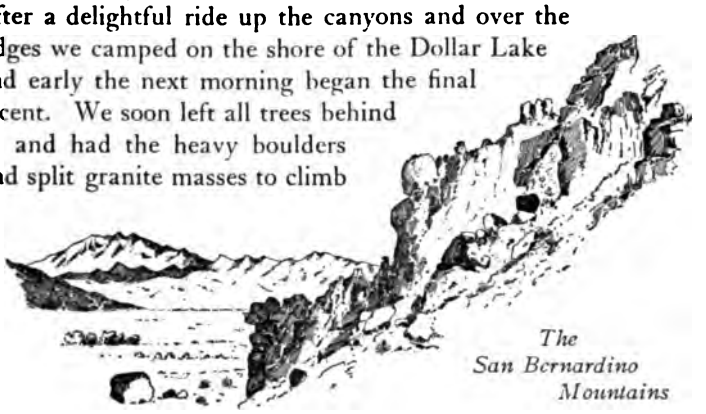
From the map it will be seen that the detached mountains between the Salton Basin and the Mohave Desert have names, as the Pinto, Cottonwood, Coxcomb, etc. Of this region Lieut. Williamson wrote in these mountains and the mountains on the Mon known of the country. I had never heard of a ho had penetrated it. I am inclined to the belief th rren, mountainous desert, composed of a system of b untain ranges. It would be an exceedingly difficult xplore, on account of the absence of water, and the ny season of any consequence. I was informed by mmanding officer at Fort Yuma that there they usually had but one rain during the year, which fell in August."

I can confirm all that is said above, yet such is the persistent energy of man in the face of obstacles that it has been explored and the names noted on the map were given during the past half century by miners or prospectors and were generally used at first merely to distinguish them one from another. Custom has now hallowed the use, and most of them are commonly received and well known. The Pinto Mountains receive their name from the fact that they are "pinto" or painted, the word being a corruption of the Spanish pintado. The Cottonwood Mountains have a most beautiful oasis where several large, fine cottonwoods grow near what, on the desert, is considered an abundant supply of water. The Eagle Mountains were found to be the home of several eagles, and chuckwallas abound in the split-up rocks of the Chuckwalla Mountains. The Coxcombs need only to be seen, with their bold, several-thousand-feet-high granite imitations of coxcombs, to be identified by the most careless observer, and the color of the Chocolate range distinguishes it the moment it is seen.

Copyright, 1903, C. C. Pierce & Co., Los Angeles, Cal.

PALMS CLIMBING THE RIDGES ON THE COLORADO DESERT

Several years ago I made the ascent of San Gorgonio. I have also made it recently. For convenience I will write of the two trips as one. In stage we traveled from Redlands into the heart of the Santa Ana Canyon, where, at a well-watered ranch, we changed to the burro train. For several miles the trail led up the canyon and over the slopes until the camp of Seven Oaks was reached at an elevation of five thousand feet, about twenty-two miles from Redlands. After a day or two of rest, riding over to the Great and Little Bear Valleys and seeing the great dam which impounds water for the thriving cities in the valleys below, a companion, A. H. Pratt, and I set out for San Gorgonio. After a delightful ride up the canyons and over the ridges we camped on the shore of the Dollar Lake and early the next morning began the final ascent. We soon left all trees behind us and had the heavy boulders and split granite masses to climb



The San Bernardino Mountains

over. Pratt carried the camera and I a half-dozen eight by ten plates and the tripod. The altitude told somewhat on our breathing and the snowslides we had to climb added new difficulties. Step by step we forced our way along, now stopping to take breath, now lying down on the sloping snow or rugged rocks to rest. At last the flat summit was clearly outlined before us.

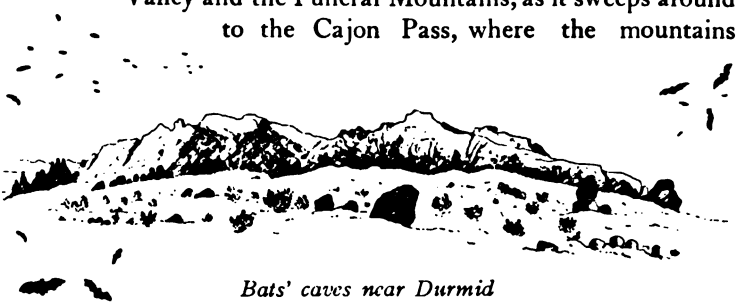
A few more gasps, a few more struggles and we were on top. I had purposely kept my eyes from looking out before I was fairly on the summit. I wished to see nothing until I could see *all.* In a moment the great vast scene was given to me. It was mine to enjoy, to wonder over, to study, and to feel its gigantic

power. The first impression was that it was not, could not be real. It was so wonderful, so vast, so extensive, so diverse, and everything was so magnified — space, distances, sandy wastes, flat plain, water — that it seemed as if it was one of the opium or hasheesh dreams of De Quincey or Fitzhugh Ludlow. It was monstrous, enlarged beyond conception, terrific in its power. Then, too, it was so strange, so foreign. It was desert, yet at our feet was a great forest, leading down to an expansive plain of snow, beyond which nestled a vast lake. Yet how could it be snow, when heat waves were ascending from it? It was a delusion, a mockery, a phantasm. No! it was not snow. It was salty efflorescence and white or gray sand. The billowy yellowish green of the trees, the mixed greens and grays of the foothills, with their verdure and granite boulders, the gray stretch of sand from the pass to Indio, the oasis caused by the flowing wells reaching from Indio for twenty or more miles in the Coachella Valley, the sand-dunes to the left and right of Indio, the Salton Sea which lay like a turquoise mass of the sky prostrate upon the earth, the grays, chocolates, reds, and browns of the mountains on either side, gave a color picture as weird and startling as it was entrancing and bewildering. The sand-dunes from this elevation assumed all kinds of hideous and monstrous shapes, as if the pterodactyls, ichthyosauri, and terrific camels, dromedaries, sphynxes, whales, leviathans, wrecked vessels covered with sand and mossy green stuff that crowd a nightmare with terrors had suddenly become transfixed here forever. The entire scene is vividly pictured in memory.

A side gorge on San Jacinto Mountains

The Mohave as well as the Colorado Desert is stretched out before us, and every one of the small desert clusters of mountains can clearly be distinguished and named. To the south, nine

thousand feet below, yawns the San Gorgonio Pass, and on the other side we can see clearly what we never before were able to understand, viz., that San Jacinto on its desert side is the steepest mountain rise known in the world, ten thousand feet in less than five miles. Just around the corner there to the southwest is the entrance to Chino Canyon, where my desert camp is hidden. Far beyond the Salton is the Imperial Valley, the green making a delicious contrast to the fierce uprising heat from the desert in and around Yuha. Lower California, Arizona, and part of Nevada are clearly to be seen, the eye resting upon Death Valley and the Funeral Mountains, as it sweeps around to the Cajon Pass, where the mountains



Bats' caves near Durmid

at our feet, pine-clad and green in their beauty, drop down to a low level. Sweeping upwards again they form the two Cucamonga peaks, San Antonio and all the lesser peaks and ridges of the Sierra Madre, leading the eye along to the San Fernando Mountains, and the Sierra Nevadas to the east, while to the west are the Sierra Santa Inés and the great placid sweep of the Ocean of Calm.

In the immediate foreground, spread out like a vast Turkish rug, lined and streaked with avenues and roads, but woven into a pattern of such sublime grandeur and inconceivable intricacy, with colors so glorious and enchanting as if angels had conceived it for the very footprints of Deity Himself, is the fertile stretch of Riverside, San Bernardino, Orange, and Los Angeles Counties, where all the semitropical verdure, trees, plants, shrubs, and flowers are gathered together to surround the dwelling-places of men.

There are not many scenes that "dwell" in the mind of a constant traveler. One shuts out another. But though I have been "on the jump" for many years, studying and observing with care, yielding myself with unrestrained enthusiasm to all new scenes, this one stands out yet as vivid and clear as it did on that morning a dozen or more years ago.

The companion peak, San Bernardino, may be reached by a seven or eight mile climb along a rugged but wide ridge. Its view is somewhat similar though not as sweeping as that of San Gorgonio. Snow on this summit falls as deep as twenty and twenty-five feet, for in June I have found wide banks from ten to twelve feet deep. Here is the source of the water supply of the desert, and not only of the desert, but of the fertile region.

Quite recently George L. Lamy, an engineer of Riverside, reported that he had discovered an underground stream flowing from the slopes of San Gorgonio to the marshes at Long Beach. He claims to have mapped this underground flow, so that he can tap it at any point, and has just closed a contract with the city of Corona for five hundred inches of water, constant flow, at a price of half a million dollars. Thus these desert sentinels prove their utility as well as their majesty and beauty.

There are several ways that one may reach the summit of Mount San Jacinto, and they are all well worth attempting. The most popular is that by way of Strawberry Valley. This valley is now a noted resort and one gains its sheltering hotel without more trouble than a pleasant stage ride. The most picturesque trail is up Palm Canyon from Palm Springs, and this is described in the chapter "From Pines to Palms." The most difficult and least known is an old Indian trail from the hot spring in Chino Canyon, but the most diversified is that from the San Gorgonio Pass at La Cueva. There is no trail, save here and there the track of the mountain sheep. Leaving La Cueva, which is at the base of the mountain on its northern side, we enter Falls Creek Canyon, passing beautiful sycamores on the way. The canyon is wild and rugged; a spur of the mountains rising sharply on one side for several thousand feet, and a sheer wall, about fifteen hundred feet high, lining the other side. One may stand on the top of

this precipice wall and throw a pebble into the creek below. The slopes of the mountain are dotted here and there with a variety of cactus and the creosote bush, artemisia, and live-oak. Along the watercourses are alders, sycamores, and live-oaks with numberless vines, mosses, lichens, liverworts, and grasses. To gain the snow ridge one now has to climb and explore. Canyon after canyon, and ridge after ridge are crossed, where icy waters flow down from the snow-fields above. The only sure plan is to resolutely edge around to the northwest; keep persistently pushing around, overcoming the difficulties as they arise. To attempt to go to the summit directly from the north is surely to court defeat, as every canyon seems to terminate in a waterfall, and the ridges are densely covered with manzanita and a chaparral of scrub-oak, greasewood, and buck-brush. This tangled mass varies from five to twelve feet high, and is often impenetrable save with an axe. But the charm and delight of exploring these rugged canyons, enjoying the waterfalls and the clear, pellucid streams of snow-water, and the rare experience of walking into snow tunnels made by the flowing water, where, at a temperature near to freezing, one can look out to ridges upon which he baked at 100° Fahrenheit a few minutes before, make this rugged north slope of San Jacinto the most desirable point of attack to the real lover of mountain climbing.

Following one of the ridges, the parallel canyon below full of deep snow, we may observe the processes at work which made in the long ago past the immense number of granite boulders found in the San Gorgonio Pass. Here are the remnants of true glaciers — weak and feeble, it is true, still actually and easily carrying masses of rock a ton and more in weight and tumbling them down into the creek below. All the creek beds are strewn with these glacier-hewn and glacier-transported boulders, and day after day one may witness the cracking or breaking off of the rock masses from the face of the cliffs.

When I think of the students in the schools and colleges in Southern California, — at Redlands, Riverside, Corona, San Bernardino, Pomona, Ontario, Pasadena, Los Angeles, Long Beach, etc., — none of them more than four hours by rail away from this point, and how they might in this grand school of Nature

learn something of her processes by actual contact, I wonder and ask myself when will the teacher of the superior (!) race learn from the Indian, and, instead of teaching his classes about glaciers and soil-making from books, bring them out into the places where these things are actually transpiring? A few days camping out here will teach lessons that ten years of books can never supply.

Higher up we come to the smoothed rock faces, where, centuries ago, the glaciers, larger than now, glided over these granite fields, shaping them into curves and domes, and grooving them with the rocks they carried along.

Remembering the tree growth on the eastern slope at the height we have now attained, here we find a somewhat different growth; there the single-leaved nut-pine being most in evidence, while here there are evergreen oaks, willows, sycamore, walnut, alder, and cottonwoods, with, now and then, a big-cone fir, a big-cone pine, and the yellow pine.

Mount San Jacinto from Whitewater

We now approach an area where there are few trees, the granite being mainly in evidence. Above this we find ourselves in the real forests where the tall timber grows. And what a change it is from the scorching desert beneath! Now and then, as we have ascended to prominent ridges, we have had wonderful outlooks, over the pass, across to the San Bernardino range, with its flashing snowfields and sparkling watercourses. We have been following the course of the railway trains from Banning down to the level of the desert floor; we can see the pulsing heat waves ascending as from an oven, and we remember our own discomfort in the heat but a day or two ago, and now! now! we are in the most delicious shade, surrounded by an atmosphere that fairly flows into every hidden place of our body, bringing cool refreshment and sensations of fresh vigor and new life. The pines sing joyously above

us, and, as we see the bare ledges of the granite above, capped by the snow-streaked summit, we cry Excelsior! and joyously dash on ahead. It is not a hard climb, nor is it dangerous. The slope is comparatively easy and, while there is dense though low undergrowth, the chief feature of which is the chinquapin, it occurs in patches which are easily avoided. In the heart of the pine forest there is no underbrush. Fires have swept it clean, but the floor is covered with a springing carpet of sweet-smelling spiculæ, and large cones which we wish we might carry off to sweeten the rooms in our house in town.

In the final climb of the last one thousand feet or so there are but few trees and when, at last, the summit is reached we feel — what? That we are well repaid? We have been repaid all the way up. Each hour's climbing has brought its own immediate reward. And the expansive view? We have stolen so many views on the way up that this adds but little to what we have already gained, except, of course, that we have a new series of views to the east, south, and west. But the chief charm to me of being on the summit is that I learn a new respect for the grand mountain itself. Everything below seems to fall into its proper place. Proportions are better understood. I know now what a truly majestic mountain I am standing upon, and henceforth it will be different. To gain this knowledge was well worth all the labor of the arduous climb.

Mount Cuyamaca is about six thousand five hundred feet above sea-level, and is one of the offshoots of the great Sierra San Jacinto. It is the most prominent of the mountains on the desert side of all the San Diego County mountains. The highest point is known as Lyon's Peak and is a bold, gaunt mass of granite, in the winter months covered with snow. It is a comparatively easy mountain to ascend, though few make the trip, as the three peaks of the San Miguel range are nearer to San Diego, easier of access, and higher than Lyon's Peak. But the surpassing joy of this ascent is the view, which has a fuller and nearer combination of all the varied features of the land. Here there is the same wonderful combination of old and new, wild and tame, uncultivated and cultivated, found on the other summits, but with the addition of the close proximity of the ocean

on one side, and the Imperial Valley on the other. Both are clearly discernible, the former lying beneath the afternoon sun like a long golden cloud, and the latter, green almost to blackness, like a vast emerald in shadow.

From the summit of these mountains, especially those standing between the desert and the Pacific, one can well study some of the phenomena of the peculiar climatology of this region. I have elsewhere explained the wind blast through the San Gorgonio Pass, and the fact that the cooled air currents flowing from the ocean back eastward over the range are met by more ascending hot air columns from the desert. This conflict of the two opposing columns explains the comparative coolness and dryness of the atmosphere on the higher slopes of the San Jacinto range and that few cooling breezes flow over the mountains into the desert in the daytime. The action of these air currents can speedily be determined by watching an ascending column of smoke from a desert fire. As it rises it flows gently to the east, going more and more slowly, until, when at an elevation of 8,500 to 9,000 feet, it comes to a standstill, and then steals off to the west. On the summit of Mount San Gorgonio I well remember the feeling of surprise at discovering the wind blowing westward, while in the canyons several thousand feet below it invariably blows to the east.

CHAPTER VI

The Volcanoes of the Desert

OLCANIC activity has made many changes in the Colorado Desert. Clarence King calls San Jacinto Mountain a volcanic peak, and the noises heard beneath it that so frighten the Indians suggest some kind of internal activity. The mountains of the continuation of the San Bernardino range below the Morongo Pass are volcanic, and the four buttes that are now islands at the southeastern end of the Salton Sea are of lava and pumice.

There are, however, in the limits to which I have confined myself, no extinct volcanic craters as on the Mohave, Painted, and other deserts of this southwestern region. Pilot Knob may be taken as an illustration of evidences of former volcanic activity, and yet there are volcanoes (or were, until a few months ago) active and alive, giving forth their messages from the heated interior of the earth. It is with these volcanoes I wish my readers to become acquainted. They are volcanoes, not of fiery lava, but of hot quicksands and mud.

Pilot Knob is a well-known landmark that has guided many a weary traveler over the desert ever since it has been traversed by the foot of intelligent man. It rises, solitary, from the Colorado River plain, a few miles southeast of Yuma. The Southern Pacific railway, as well as the river, passes close by it. Though mainly composed of granite, the bent and contorted mass, which is traversed by dikes of basalt or some dark variety of crystalline trap rock, shows so clearly the effect of volcanic action that I call attention to it here. The Knob itself is of a jet black color, and it glistens in the sun as if it had been varnished or highly polished.

Until the railway ran through the desert it is not to be wondered at that few knew anything of the mud volcanoes or *salses*. The

Indians of the country have always regarded them as the abode of evil and malignant spirits, and to the white man the fearful heat of the glaring sands and clays and alkaline beds of the desert, with the scarcity of water, and even that of a bitter and brackish quality, were sufficient obstacles to prevent his willingly risking his life to visit them. The coyote, that desert scavenger that likes liberally to thrust his nose into everything, shuns these salses. His experience has been that hot water, hotter mud, and poisonous fumes are not good for his nasal extremity, and the dried-up skin and bones of one fellow that I found on my first visit proved that one inquisitive nose had led its possessor to his death. On this first visit,

Ravine
near mud volcanoes

too, I discovered how treacherous the ground was in which the volcanoes occur. I was cautiously walking toward one of the craters from which a bubbling sound arose, when to my horror the ground gave way beneath me and had I not been more than usually quick mentally and active physically in such cases I should have been precipitated into I know not what beneath. I only know that as I threw myself backward, flat upon the earth, I heard an unusual activity in the several near-by craters, as if some demoniac spirits were expressing their anger that I had escaped the trap they had laid for me.

And this was not all the work of imagination. When Professor Hanks, the State Geologist, visited this region some years ago, he

fell through in like manner, but unfortunately did not escape as I did. His body was immersed nearly up to the shoulders in scalding hot water and mud, and only by the superhuman efforts of himself and companion was he rescued. For a time it was thought he was fatally scalded, but good care and the healing power of the desert restored him to health.

After my experience I secured two long and broad strips of wood and fastened them to my feet as Norwegian snow-shoes, or skees, and then laboriously but safely went on with my investigations.

On the occasion of my visit, in March, 1906, the ground seemed to be much firmer and these precautions were unnecessary.

Approaching the mud volcanoes

These mud volcanoes were first made known to the world by Professor Blake in the report of explorations for a railroad to the Pacific, though they were visited by Major Heintzelman and Dr. J. L. Le Conte in 1850, while the former was stationed at Fort Yuma. There are two areas of them, one near Sierra Prieta and Volcano Lake in Lower California, and the other not far from Pelican Island, and now covered by the Salton Sea. I shall describe the latter only.

On approaching the salses one can hear the wild rush of the steam, the hollow sounds of the mud explosions and the peculiar murmur of the boiling caldrons of quicksand. The space occupied is about five hundred feet long and three hundred and fifty broad, slightly elevated above the clayey plain. We had to wade through a narrow and shallow pond of salt water to reach the

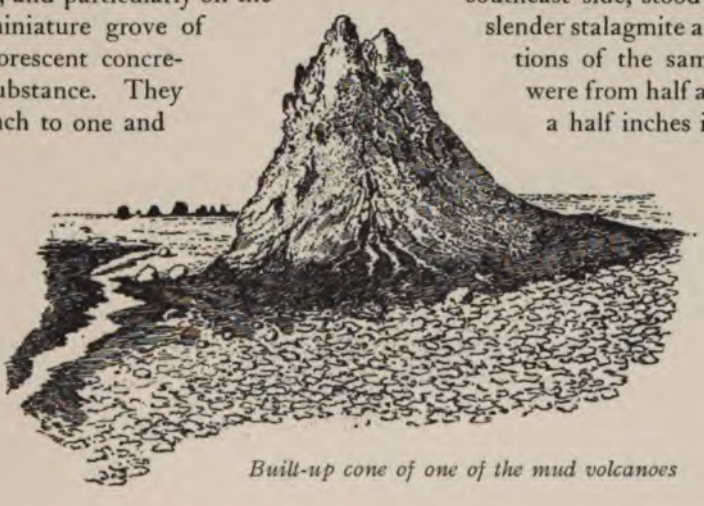
volcanoes. The smell of sulphur was quite strong, and the bubbling, soughing, hissing, venting, and spitting of the water, steam, and mud filled our ears. There were over a hundred vents of one kind or another, most of them so small as to be perfectly ridiculous. It seemed as if a lot of tiny devils were playing at making volcanoes: watery mud, scalding hot, bubbled and gurgled and frothed in the same way that artesian water bubbles over the top of its casing. Black, ill-smelling, and fearsome it was.

Here is Veatch's description, which in one or two particulars differs materially from what we saw: "The steam jets of the salse issue from conical mounds of mud varying from three to

The seething caldron of boiling mud and quicksand

fifteen feet in height, the sides presenting various angles, some being sharp and slender cones, others dome-shaped mounds that seem to have spread and flattened out with their own weight, upon the discontinuance of the action that formed them. Out of some of the cones the steam rushes in a continuous stream, with a roaring or whizzing sound, as the orifices vary in diameter or the jets differ in velocity. In others the action is intermittent, and each recurring rush of steam is accompanied by a discharge of a shower of hot mud, masses of which are thrown sometimes to the height of a hundred feet. These discharges take place every few minutes from some of the mounds, while others seem to have been quiet for weeks or months. During our short stay we had specimens of the rapidity with which a sharp, conical mound

could be built up and again tumbled down. In one place a stream of hot water was thrown up from fifteen to thirty feet, falling in a copious shower on every side, forming a circle within which one might stand without danger from the scalding drops, unless the wind chanced to drive them from their regular course. It issued from a superficial mound out of an opening about six inches in diameter; but the column of steam and water, immediately upon issuing, expanded to a much greater size. The orifice was lined with an incrustation of carbonate of lime, and around it, and particularly on the southeast side, stood a miniature grove of slender stalagmite arborescent concretions of the same substance. They were from half an inch to one and a half inches in



Built-up cone of one of the mud volcanoes

diameter, and from four to eight inches in height. Many of them were branched and the tips colored red, contrasting beautifully with the marble whiteness of the trunk, and resembling much a coral grove. Some were hollow, and delicate jets of steam issued from their summits, and this seemed to explain the mode of their formation. Some were not hollow throughout, being closed at the summit, but when detached from their base, a small orifice in the center suffered hot steam to pass, and some degree of caution was required to remove them without scalded fingers. To approach the spot was a feat of some difficulty, surrounded as it was by a magic circle of hot rain. I retreated, scalded, from the only attempt I dared make; but my son, more adventurous

or more attracted by the beauty of the specimens, succeeded in bringing away several. The falling water ran off into a pool a foot deep, but what became of it was not apparent, as it had no seeming outlet. I brought away a bottle of it for examination. It was transparent, but had an intensely bitter and saline taste. A little beyond, on either hand, are two huge caldron-like basins, sunk five or six feet below the general level, and near a hundred feet in diameter. Within these caldrons a bluish argillaceous paste is continually boiling with a dull murmur, emitting copious sulphurous vapors, and huge bubbles, bursting, throw masses of mud to the height of several feet. These kettles sometimes boil over, and the matter runs off in a slimy stream toward the Salt Lake. This seems to have been the case recently, as we encountered the track of one of these streams, not yet dry, a mile from the salse."

I have never seen the volcanoes in the high state of activity thus described by Dr. Veatch. There is every reason to assume that they have periods of greater and lesser activity. In March, 1906, there was no hot water being thrown up to a great height. The evidences of greater activity than we saw, however, were most abundant in several quiescent craters. The tininess of some of the vents was a source of amusement to me, for they were so small that my lead pencil effectively checked their spitting and fizzling. I thrust it down one of them as far as it would go, and when it was withdrawn the little crater, or cone, like a vicious cat, spat and hissed at me in a very funny manner.

When I circumnavigated the Salton Sea in June, the whole volcanic area was under water. Not a trace or sign of it remained save the four volcanic buttes, which are now islands.

I now await with great interest the "going down" of the Salton Sea, and the uncovering of the volcanoes. Will the water have quenched the internal fires? Have they been quieted forever? How will the ground be affected? These and other questions I hope to solve soon after the water subsides.

CHAPTER VII

Explorers and Pathfinders

OW many centuries is it since the first man saw the desert? Who first gazed upon the wastes of the Colorado? What foot first trod the virgin sand after this new-made area was wrested from the Gulf of California? Was there any horror, any terror, any surprise, as its wonders were revealed for the first time? And what existed there then? Was there much difference compared with what we now see? How did it first appear?

Ah! these questionings of the human mind; these problems that are constantly arising before us and demanding solution; what a blessing they are to us; how they stimulate research and add to man's capacity and knowledge.

Birds, doubtless, first saw the Colorado Desert as it slowly assumed the form and appearance it now possesses. In calm indifference they soared the empyrean and floated across the waste, not perceiving, perhaps, that change was taking place. And yet the water-birds must have noted a change. Those that nested in the mountains or foot-hills near the San Gorgonio Pass, and "fished" in the silent waters as the pelicans and herons now fish in the Salton Sea, followed the retreating waters and, if they were capable of it, wondered at the close of each day to find their homeward flight so much the more prolonged.

Then the animals of the foot-hills, who had laved in and drank of the waters of the great inland sea; they walked to and fro each morning and night over the freshly emerged land. They were the first pathfinders. They made the first trails. Over the washed-down sands of the mountains, now and ever-henceforth-to-be desert sands; around the surface irregularities of the newly exposed area they stealthily moved, some fearful and timorous, some bold

and courageous, but all alike seeking the precious fluid which each day seemed to be going farther and farther away.

The grizzly, the mountain lion, the antelope, deer, bighorn, coyote, fox, gopher, rat, jack-rabbit, cottontail, — *these* first discovered the desert and explored its yet virgin wastes.

So that when man, dusky man, came on the scene, all he had to do was to follow the paths already made and he would find most of the places and objects that were by him desired. For, on the desert, the needs of primitive man are not very far removed from those of the lower animals. Food, drink, shelter for one's self and one's family, — these though insistent and imperative needs are not large needs: they are comparatively easily satisfied.

Juan Segondo at Torres

For long centuries our brown brother traversed the desert alone; unmolested and unafraid, save for fear of others of his kind who might need the small supply of water upon which he and his were relying. He dug the wells that now tell of his early wanderings and habitations; he found the quickest routes from diverse and divergent points; his unclad foot wrested from the reluctant soil the token of his journeys in the form of trails and paths; his eye witnessed the first growth of flowers, cactus, and trees. He was the first to realize how vast the difference between the desert covered with flowers after the rains, and the desert of the hot scorching months. He first felt the fierce and withering blasts blowing down the San Gorgonio Pass, and saw the piling up of the moving sand-dunes. His eyes first gazed upon the spitting and fuming, the bubbling and soughing of the sand and mud volcanoes, and he first saw the deposits of salt and the millions of shells that now arrest the gaze of the white visitant.

Then came the explorer of the white skin; the man with lust in his eye, — lust for gold, new territory, achievement, conquest. By 1522 Cortés had subjugated the continent from the isthmus of

Tehuantepec to Pánuco and Colima. Forces were sent south into Guatemala, while Cortés dreamed of further explorations and discoveries north. The activity of his enemies sent two powerful foes to harass and circumvent him. One of these, Nuño de Guzman, was to have a large share in shaping events which led to the discovery of the Colorado Desert region to the Spaniard, for in person he went northward and discovered and subjugated much new territory. Then came the Viceroy Mendoza. Cabeza de Vaca had made his memorable trip across the continent. Marcos de Niza was sent on his reconnaissance which led to the discovery of Arizona and New Mexico, and then Cortés and Mendoza engaged in a strenuous political fight as to who should explore the northwest region further. Cortés claimed the exclusive right, and Mendoza naturally wanted some share in such interesting proceedings which were liable to bring honor, fame, and wealth to their successful prosecutor. Cortés succeeded in making the first start. He sent Francisco de Ulloa, with three vessels, up the coast from Acapulco, July 8, 1539. This was the expedition that discovered that there was a gulf,—now known as the Gulf of California,—but Ulloa, on reaching the head, made no attempt to explore it, contenting himself with noting that the low sandy shores, about a league off, united. Had he sent a boat to that "point of uniting" he would have discovered the Colorado River, which there enters the gulf.

It was now Mendoza's turn. Coronado was sent overland on that great march of his to New Mexico, and Pedro de Alarçon was made head of a maritime expedition which was to co-operate. Though Ulloa had discovered no river at the head of the Gulf of California, there seemed to be a general idea prevalent that there was such a river, for Alarçon's instructions implied that he was to sail up it, and keep in touch with Coronado as he journeyed to the regions described by Marcos de Niza.

It was in May of 1540 that Alarçon sailed, with two vessels. At Culiacan he found a third vessel which had been sent on ahead with supplies. These three vessels then proceeded northward, and when he reached the spot where Ulloa had turned back he combated the wishes of those of his own company who were desirous of returning by sending out two pilots. These men found the

passage up which, with great difficulty and narrow escapes from grounding, the vessels passed, finally coming to anchor at the mouth of a great river, the current of which was so rapid that they could scarce stem it. Here Alarçon left his vessels, and taking two shallops, manned by twenty men and two officers, he pushed his way up the river for nearly sixteen days. The Indians at first were troublesome, but soon became more friendly and solicited Alarçon to remain and become their chief. There is no definite data by which we can determine exactly how high up the Colorado River Alarçon went. He did not find any news of Coronado, however, and so returned, making the downward journey in two days and a half, owing to the swift current. A little later he ascended the river again to a point beyond where the river flowed between high mountains, and, according to his own statement, eighty-five leagues from the head of the gulf. It is likely, however, that the doughty Spaniard measured the leagues by his feeling of weariness as his boats were towed up the sinuous and tortuous channel of the Colorado. Scores of miles are lost daily in this manner. The banks are winding to a degree seldom found, and the river itself runs its tortuous course, first on one side, then on the other, crossing and recrossing until one can no longer keep count of the times. So it is not to be wondered at that when Melchior Diaz came by land to the spot where Alarçon had left letters at the foot of a large cross, he estimated the distance as fifteen leagues from the mouth. There is great discrepancy between eighty-five and fifteen, hence we are left to conjecture as to whether Alarçon ever gazed upon that portion of the Colorado Desert now within the confines of the United States. General J. H. Simpson, however, believes that he passed several miles beyond the junction of the Gila with the Colorado, although it seems reasonable to expect that had he done so he would have made some note of so important a fact.

That Diaz and his party walked on the Colorado Desert is pretty well assured, and to them the honor of being the first white men to explore the region must be accorded. For, after reading Alarçon's letters, Diaz followed the course of the river upward for five or six days, and then concluded to cross it by means of rafts. The Indians of the region — the Cumanas — had not been hospitable,

by any means, and one of their medicine-men had endeavored to stop Alarçon from proceeding farther up the river by placing magic reeds on the bank. These Indians were undoubtedly the Yumas. Substitute "Y" for "C" in the name "Cumanas" and the Spanish form of spelling the tribal name is apparent. To this day the Yumas are hostile. The white man is an intruder. They want to live alone, unmolested, undisturbed.

Their craft and cunning in dealing with Diaz were what one now familiar with them might expect. They readily responded to his request to help make the needful rafts and assist his soldiers in crossing the river. What a chance was here! Get the hated intruders separated, some on one bank, some on the other, and still others on the rafts in the act of crossing, and then attack them. Strategy indeed, not unworthy of soldiers of greater pretensions than our Yumas. But Diaz was one too many for them. Danger had taught him to meet craft with craft, cunning with cunning. One of his soldiers reported suspicious circumstances; one of the Indians was arrested, put under torture and soon the whole plot was revealed. Open hostilities were now engaged in, and only by the use of his superior weapons was Diaz able to drive the Yumas away to the mountains. Then, free from interruption, he and his party crossed the river to the California side and the Colorado Desert felt the tread of its first white explorer. For four days Diaz wandered on the desert. It was a hard trip. The sands were like hot ashes, he reports; the earth trembled, and the whole country was desolate and forbidding. No wonder four days of it satisfied him. He fled from its scorching weariness and it saw him again no more.

In 1604 Juan de Oñate, the reconqueror and governor of New Mexico, marched from San Juan de los Caballeros (a small town near where Santa Fé now stands) to the west, with the intention of discovering a new portion of the Mar del Sur (South Sea, or what we now know as the Pacific Ocean). From this journey he hoped to gain fame and wealth. The conquests of Cortés and others inflamed the minds of the earlier explorers, and the country was pretty well known before hope was abandoned of startling results from each enterprise. Oñate crossed New Mexico and left his autograph chiseled in stone upon the interesting rock known as

"El Morro." He reached the Colorado River by the Bill Williams fork and had various adventures with the Mohaves, and on the twenty-third of January, 1605, reached tide-water. He christened the port "San Pablo" and then returned to New Mexico. It must have been on his return trip that he stopped at El Morro, for he reached San Juan on the twenty-fifth of April, and the date of the inscription is April 16, though the latter says 1606 while the records give it 1605.

From this time on we know of no white man visiting the desert until after the missions in Alta California were established. The peninsula of California was discovered, Jesuit missions were founded and conducted for seventy years, and then came the movement for the colonization and missionizing of Alta California which I have fully treated in my "In and Out of the old Missions of California." After the Franciscans had established some of their missions in Alta California it was found to be too long a journey to reach them only by way of the gulf and up the peninsula. The missionaries in Northern Sonora had made several *entradas* toward the Colorado River, and one of them, Francisco Garcés, the most indefatigable of all, save the Jesuit Padre Kino, in 1771, came from San Xavier del Bac, near Tucson, crossed the Colorado and made some confused wanderings on the desert of which it is impossible to give any connected account.

Pounding mesquite beans

It must be remembered that at this time there were no white men in Arizona except at the few missions among the Pimas and the Hopi, and none in California save at the five missions already established. The whole region across Arizona and California, until the San Gorgonio Pass was reached, was one of horror and desolation even to these experienced travelers.

The first Christian to make the whole trip across the desert from San Gabriel to the presidio of Tubac (forty miles south of

the present Tucson, Arizona) was an Indian, Sebastian by name, who had fled from the mission with his parents and wife. He had wandered far to the east to avoid meeting soldiers who would return him as a deserter. His family all perished, either by hostile Indians or the hardships they had to endure, but there is no doubt but that Sebastian crossed the San Gorgonio Pass and traversed the desert to Yuma, where he was taken by the natives to the Pima and Papago country and came in contact with Captain Juan Bautista de Anza. This gallant officer was the commandant of the presidio of Tubac, and he had long expressed his desire to participate in the colonization of California.

The Viceroy Bucareli at length granted him a license to explore the country from Tubac to the California missions to see if a feasible route could be made of it for subsequent travelers to and from the missions, and on the eighth day of January, 1774, with Sebastian as a guide, and Padres Font and Garcés as spiritual advisers, the desert caravan started. There were thirty-four men in addition, with one hundred and forty horses and sixty-five cattle. On reaching the Colorado River, Anza made friends with Palma, a well-known Yuma chief, who accompanied the party across the river as far as a lagoon to the southwest which was formed by the Colorado in time of flood. Then for six days Anza wandered through a country so destitute of grass and water that he was compelled to return to the lagoon, and beg the assistance of Palma. Where he wandered during these six days it is impossible to tell, but supposing the lagoon to the southwest of Yuma to be below the Mexican line it is very probable that it was in what we know as the Imperial Valley. Palma now directed Anza which way to go, and the Indian followed after with the baggage, horses, and cattle. Thus guided Don Juan had little trouble in going from water-hole to water-hole over the sand-hills, and into the Salton Sink north until the San Gorgonio Pass was reached, which they called "Puerto de San Carlos." Thence over the Santa Ana River to San Gabriel the rest of the journey was comparatively uneventful and easy.

While Anza went on to Monterey, he sent Padre Garcés back, over the desert, to the Colorado River, there to await his return.

Garcés made the journey in twelve and a half days,—not bad traveling for April weather.

Anza was not long behind, for he spent three days only at Monterey and then started back taking Garcés' track at San Gabriel. How those old-day rollickers lived on horseback! Here is a leader of an expedition who has just made the terrific journey of a thousand miles over an untried desert from below Tucson, Arizona, not in a Pullman or a comfortable Southern Pacific chair car, but on horseback, carrying all his supplies with him, starting back three days after his arrival. Surely there is a vast difference between the endurance of the men of the present day, who would no more think of riding a horse a thousand miles than they would of walking that distance, and the old Spanish soldiers who regarded such trips as a part of their everyday life.

And this journey, successfully completed, was but preliminary to a second one taken over the same country in 1775, when, with 240 persons, and over a thousand horses, mules, and sheep, he journeyed from Tubac to San Francisco. He it was who located the site of the presidio and mission in the City of Destiny by the Golden Gate. That was a wonderful trip over the desert, and it required no little courage, leadership, and knowledge to get such a party safely over the sandy wastes. It was midwinter, the cold was intense, for, strange to say, they were met day after day with storms of snow, hail, and rain. And when it is cold on the desert the thinned blood feels it more; and we are not surprised at the record in the commandant's diary that his people suffered cruelly. There was considerable sickness but no fatality. About a hundred head of stock were lost, as water was so scarce that the fevered animals could not be restrained from breaking away in search of it. The party often had to be divided so that all should not reach the water-holes, with their poor and scant supply, at the same time. Wells were dug in many places. The scarcity of feed for the animals was another source of great discomfort. There were a number of women in the party, twenty-nine of them being soldiers' wives, and on the journey eight infants were born. The route taken was about the same as before, across the Colorado River at Yuma, over the Salton Basin and through the Mesquite

country to the San Gorgonio Pass, and thence to San Gabriel and Monterey.

From this time on this route was often followed, though in 1781 it was brought into sad repute by the horrible massacre of the Spaniards at Yuma. In 1780, Garcés had succeeded in establishing two mission pueblos there, but the influence of the friendly Palma was not sufficient to curb the spirit of hostility the Yumas had always felt at the presence of the strangers. In June, 1781, Rivera, who had held the offices of governor of both Lower and Upper California, arrived at Yuma with a band of colonists bound for Los Angeles and the Santa Barbara region. He crossed the Colorado, dispatched his party over the desert and then encamped on the eastern bank, with eleven or twelve men. On Tuesday, July 17, the Indians fell upon the white settlers at the two pueblo missions and also upon Rivera and his soldiers and succeeded in massacring forty-six of them, the ex-governor among the number.

Padre Garcés at his camp-fire

Ensign Limon, who had escorted the settlers to San Gabriel, was the one to discover the dreadful facts from the California side. He was returning with his nine men, when some of the desert natives informed him of the terrible outbreak. Leaving two men in charge of his animals he rushed ahead, using great care, however, in order to reconnoiter. Blackened ruins of buildings, dead bodies lying around in the plaza, and a fierce attack upon himself in which he and his son were wounded, were forceful corroboration of the hideous stories. Hastily he started to return to San Gabriel, only to find the two men left with the animals killed. Terror-stricken the wounded man made his weary way back over the

desert to San Gabriel, where the news was received with consternation.

It was determined to punish the Yumas, and two forces were sent out at different times, one from Sonora, and the other from the California side, but it was a poor-spirited campaign and next to nothing was accomplished. Suffice it to say the ringleaders were never caught or punished and the general effect of both efforts was to confirm the Indians in their hostility without inculcating in them any fear of the Spanish power. Hence in future the route over the Colorado to Sonora was regarded with great disfavor, though we have record of its being occasionally used.

In 1782, Don Pedro Fages, afterward governor, made the first trip ever recorded from the Colorado River to San Diego; a weary and arduous journey as all who have taken it since can testify. In 1783 an ensign tried to follow this route and see if it could be made practicable for constant use, but he came no farther than the mountains overlooking the desert and then returned. For several years desultory explorations took place from San Diego, but the route was too arduous to lead to its adoption and few ever used it until the coming of the United States Army of the West under Kearney in 1847, after which it became the Southern route for the gold seekers.

One of the desert's notable pathfinders was Jonathan Trumbull Warner (commonly known as Juan José Warner), from whom Warner's Ranch obtained its name. Born in Lyme, Connecticut, in 1807, ill health at the age of twenty-three forced him to seek a milder climate. He fell into that great current of humanity that was sweeping westward and the end of the year found him in St. Louis. The following year he formed an expedition to Santa Fé, and soon after his arrival there struck out, with eleven men, under the leadership of Jackson, Waldo, and Young for California. He crossed the Colorado River below the Gila, and then in November struck across the desert to San Diego via San Luis Rey, which he duly reached. After merchandizing in Los Angeles and engaging in other ventures, he was granted the ranch that bears his name, having been naturalized as a Mexican citizen, and in 1844 he moved there with his family, living there for thirteen years until driven off by an uprising of the Indians.

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

PALMS IN THE OPEN, COLORADO DESERT

In November, 1831, Dr. Thomas Coulter, an English scientist, visited California, and made a trip from Monterey via San Gabriel to the Colorado River and back. He rode over the San Felipe Pass and crossed the desert by the southern route. His map shows that he went by the way of Pala.

Perhaps one of the most sensational and talked-about rides over the desert was that made in 1834, by a special courier, said to have been Rafael Amador, who rode from the City of Mexico to Monterey in forty-eight days (some say forty days). Think of that lonely trip, constantly beset by dangers from hostile Indians and never free from the dread of death by starvation, thirst, and

Rafael Amador's ride

losing his way. It was July when he started, and August is always a terribly hot month. The Yumas caught him and threatened his life, only releasing him after stripping him of all his equipment and most of his clothing, besides stealing his horse. He crossed the Colorado Desert at that scorching time on foot, and for three days was without water. He took the hardest route and struck out over the mountains to the south and finally reached San Luis Rey almost dead with fatigue and the hardships he had undergone.

It should be stated that he was bearing a dispatch from the Mexican dictator, Santa Anna, to Governor Figueroa, rescinding prior instructions which had been issued requiring the governor

to hand over his office to Don José Maria Hijar. Whether his mission was suspected or not I cannot say, but it is claimed that a friend of Hijar's ambushed and captured the courier and then urged Hijar to hurry to Monterey and seize the governorship before the message could prevent. But Hijar refused, and the courier was released and allowed to proceed on his way. His reward for the great trip is said to have been three thousand dollars.

It was in 1826 that the first trapper of the United States entered the Colorado Desert. Jedediah Smith was an adventurous spirit who, with fifteen companions, left Utah, near the Great Salt Lake, and wandered down the Gila to the Colorado. He crossed the river where the Mohaves dwell and was greatly impressed by their kind hospitality. Not only did they supply the party with fresh provisions, but they gave them horses which they had stolen from the Spaniards, and then supplied them with guides to direct their way over the desert to the mission of San Gabriel. There is no doubt that their route took them to the northern extremity of what is now Riverside County, as they entered the San Gabriel Valley over El Cajon Pass, near San Bernardino.

Though not on this trip with Jedediah, Thomas L. Smith, generally known as "Pegleg" Smith, was one of his later companions, who had many wild adven ures, some of them inseparably connecting his name with the Colorado Desert as is recorded in another chapter.

There is no doubt that several trappers and hunters crossed the Colorado Desert between the time of Smith's explorations and the coming of Kearney's Army of the West.

When the general reached the Colorado in November, 1846, he intercepted a party of Mexicans going from California to Sonora with five hundred horses to strengthen General Castro's forces. On one of these men were found dispatches telling of the revolt against the American occupancy of California, and this hastened Kearney's actions. He pushed on across the desert to Carrizo Creek, through the San Felipe Pass, only to meet with disaster and temporary defeat from the forces of Andreas Pico at San Pasqual. Colonel W. H. Emory's description of the desert journey is too interesting and valuable to lose, so I here quote largely from it.

"After crossing, we ascended the river three-quarters of a mile, where we encountered an immense sand drift, and from that point until we halted the great highway between Sonora and California lies along the foot of this drift, which is continually but slowly encroaching down the valley.

"We halted at a dry arroyo, a few feet to the left of the road leading into the Colorado, where there was a hole five or six feet deep, which by deepening furnished sufficient water for the men. We tied our animals to the mesquite trees, *Prosopis glandulosa*, and remarking on the way that they showed an inclination to eat the bean of this plant, we sent the men to collect them; the few gathered were eaten with avidity.

"November 26. — The dawn of day found every man on

The weary march of Kearney's soldiers

horseback, and a bunch of grass from the Colorado tied behind him on the cantle of the saddle. After getting well under way, the keen air at 26° Fahrenheit made it most comfortable to walk. We traveled four miles along the sand butte in the same direction as yesterday. We mounted the buttes and found, after a short distance, a firmer footing covered with fragments of lava, rounded by water, and many agates. We were now fairly on the desert. . . .

"After traveling twenty-four miles we reached the Alamo or Cottonwood. Notwithstanding the name there was no cottonwood here, but Francisco said it was doubtless the place, the tree having probably been covered by the encroachment of the sand, which here terminates in a bluff forty feet high, making the arc of a great circle convexing to the north.

"Descending this bluff, we found in what had been the channel of a stream, now overgrown with a few ill-conditioned mesquite, a large hole where persons had evidently dug for water. It was necessary to halt to rest our animals, and the time was occupied in deepening this hole, which after a long struggle showed signs of water. An old champagne basket, used by one of the officers as a pannier, was lowered in the hole to prevent the crumbling of the sand. After many efforts to keep out the caving sand, a basketwork of willow twigs effected the object, and much to the joy of all the basket, which was now fifteen or twenty feet below the surface, filled with water. The order was now given for each mess to draw a camp-kettle of water, and Captain Turner was placed in charge of the spring to see fair distribution.

"When the messes were supplied the firmness of the banks gave hopes that the animals might be watered, and each party was notified to have their animals in waiting; the important business of watering them commenced, upon the success of which depended the possibility of their advancing with us a foot farther.

"Two buckets for each animal were allowed. At 10 A.M., when my turn came, Captain Moore had succeeded, by great exertions, in opening another well, and the one already opened began to flow more freely, in consequence of which we could afford to give each animal as much as he could drink. The poor brutes, none of which had tasted water in forty-eight hours, and some not for the last sixty, clustered round the well and scrambled for precedence.

"At 12 o'clock I had watered all my animals, thirty-seven in number, and turned over the well to Captain Moore. The animals still had an aching void to fill, and all night was heard the munching of sticks, and their piteous cries for more congenial food.

"November 27 and 28.—To-day we started a few minutes after sunrise. Our course was a winding one, to avoid the sand-drifts. The Mexicans had informed us that the water of the salt lake, some thirty or forty miles distant, was too salt to use, but other information led us to think the intelligence was wrong. We accordingly tried to reach it; about 3 P.M. we disengaged ourselves from the sand and went due (magnetic) west, over an

immense level of clay detritus, hard and smooth as a bowling green.

"The desert was almost destitute of vegetation, now and then an *ephedra*, *œnothera*, or bunches of *aristida* were seen, and occasionally the level was covered with a growth of *obione canescens* and a low bush with small oval plaited leaves, unknown.

"The heavy sand had proved too much for many horses and some mules, and all the efforts of their drivers could bring them no farther than the middle of this dreary desert. About eight o'clock, as we approached the lake, the stench of dead animals confirmed the reports of the Mexicans and put to flight all hopes of our being able to use the water.

"The basin of the lake, as well as I could judge at night, is about three-quarters of a mile long and half a mile wide. The water had receded to a pool, diminished to one-half its size, and the approach to it was through a thick soapy quagmire. It was wholly unfit for man or brute, and we studiously kept the latter from it, thinking that the use of it would but aggravate their thirst.

"One or two of the men came in late and rushing to the lake threw themselves down, and took many swallows before discovering their mistake; but the effect was not injurious except that it increased their thirst.

"A few mesquite trees and a chenopodiaceous shrub bordered the lake, and on these our mules munched till they had sufficiently refreshed themselves, when the call to saddle was sounded and we groped silently our way in the dark. The stoutest animals now began to stagger, and when day dawned scarcely a man was seen mounted.

"With the sun rose a heavy fog from the southwest, no doubt from the gulf, and sweeping toward us, enveloped us for two or three hours, wetting our blankets and giving relief to the animals. Before it had dispersed we came to a patch of sunburned grass.

"When the fog had entirely dispersed we found ourselves entering a gap in the mountains, which had been before us for four days. The plain was crossed but we had not found water. The first valley we reached was dry, and it was not till 12 o'clock M. that we struck Carrizo (cane) Creek, within half a mile of one of its

sources, and although so close to the source, the sands had already absorbed much of its water, and left but little running. A mile or two below, the creek entirely disappeared.

"We halted, having made fifty-four miles in the two days, at the source, a magnificent spring, twenty or thirty feet in diameter, highly impregnated with sulphur, and medicinal in its properties. No vessel could be procured to bring home some of the water for analysis, but I scraped a handful of the salt which had effloresced to the surface of the adjacent ground, and Professor Frazer finds it to contain sulphate of lime, magnesia, and chloride of sodium.

"The spring consisted of a series of smaller springs or veins, varying in temperature from 68° to 75°. This variation, however, may have been owing to the different exposures of the fountains in which the thermometer was immersed. The growth was cane, rush, and a coarse grass, such as is found on the marshes near the seashore.

"The desert over which we had passed, ninety miles from water to water, is an immense triangular plain, bounded on one side by the Colorado, on the west by the Cordilleras of California, the coast chain of mountains which now encircles us, extending from the Sacramento River to the southern extremity of Lower California, and on the northeast by a chain of mountains, a continuation of the same spur noted on the 22d as running southeast and northwest. It is chiefly covered with floating sand, the surface of which, in various places, is white with diminutive *spinelas*, and everywhere over the whole surface is found the large and soft mussel shell.

"I have noted the only two patches of grass found during the 'jornada.' There were scattered, at wide intervals, the *palafoxia linearis*, *atriplex*, *encelia farinosa*, *daleas*, *euphorbias*, and a *simsia* described by Dr. Torrey as a new species without rays.

"The southern termination of this desert is bounded by the Tecaté chain of mountains and the Colorado; but its northern and eastern boundaries are undefined, and I should suppose from the accounts of trappers, and others, who have attempted the passage from California to the Gila by a more northern route, that it extends many days' travel beyond the chain of barren mountains which bound the horizon in that direction.

"The portal to the mountains through which we passed was formed by immense buttes of yellow clay and sand with large flakes of mica, and seams of gypsum. Nothing could be more forlorn and desolate in appearance. The gypsum had given some consistency to the sand buttes which were washed into fantastic figures. One ridge formed apparently a complete circle, giving it the appearance of a crater; and although some miles to the left I should have gone to visit it, supposing it to be a crater, but my mule was sinking with thirst, and water was yet at some distance. Many animals were left on the road to die of thirst and hunger in spite of the generous efforts of the men to bring them to the spring. More than one was brought up by one man tugging at the halter and another pushing up the brute by placing his shoulder against its buttocks."

But though they had entered the pass their difficulties were by no means over. Grass was luxuriant at places but very salt, the water strongly resembled that at the head of Carrizo Creek, and the earth, which was very tremulous for many acres above the pools, was covered with salt. The sharp thorns terminating every leaf of the century plant, *Agava Americana*, gave great distress to the dismounted and wearied men, whose legs were now almost bare.

The middle of the day was intensely hot and the poor horses and mules gave out by the score. Though only sixteen miles were traveled one day, many did not arrive at camp until ten o'clock. The wolves or coyotes followed them in droves and made sleep impossible as they battled over the carcasses of the abandoned animals. Horse and mule meat were their chief article of food, save what they could swallow of the leaves of the cactus.

It was on the first of December that they descended to the deserted Indian village of San Felipe. The mountains on either side, supposed to be from three thousand to five thousand feet high, were incrusted on the top with snow and icicles, and they encamped in a grassy valley watered by a warm stream which drained through a canyon to the north abreast of the village. From here through Warner's Ranch to Agua Caliente their journey does not particularly concern us, though it was a tragical ending to their nearly two

thousand miles of weary traveling that, at San Pasqual, eighteen of them, officers and men, were killed, and thirteen wounded by the onslaughts of the Californians.

This party was soon afterward followed by another whose trip was even more arduous, as it was encumbered with a wagon train. When General Kearney (then Colonel) started from Fort Leavenworth for New Mexico and California he succeeded in having two troops of dragoons attached to his command. The captain of one of these was P. St. George Cooke. At the same time an officer was sent to organize a battalion of five hundred men from the Mormons who had just been expelled from Nauvoo, Illinois, which was to follow to Santa Fé. On its arrival at Santa Fé Lieutenant-Colonel Cooke was appointed to its command and ordered to follow General Kearney *with a wagon train*, making its own road to San Diego.

It was a frightful trip to undertake: eleven hundred miles, the major part of which was through an unknown wilderness without road or trail. Many of the soldiers of the battalion were too old, too young or feeble; it was undisciplined; it was already worn out, for it had marched, on foot, from Nauvoo, Illinois, to Santa Fé; clothing was scant; there was no money to pay them and no stores from which clothing could be issued.

When the Gila was reached, sixty miles above the Colorado, Colonel Cooke sought to lighten the rest of the journey by constructing a raft and allowing the wagons and men to float down. His experiment was most unfortunate, as it proved to be a signal failure, owing to the shallowness of the water on the sand-bars. The difficulties in taking the wagons across the Colorado almost overcame both men and mules, and it was a weary and sorry-looking outfit that began the trip across the hardest portion of the desert. When Carrizo Creek was reached some of the poor animals had been without water for fifty hours. Men and beasts were almost exhausted, and could travel only a few miles a day, and to use an Hibernianism, those had to be traveled at night. Then came a great shock. After they had ascended three miles of the San Felipe divide with great labor the canyon was found to be so narrow that they could not get their wagons through. The advance guard, the pioneers, and guides were unable to proceed

and one of them coolly remarked, "I believe we are at a standstill." I can well imagine the feeling of desperation that came over the colonel as he saw those men standing there, idly waiting for him to come up, instead of doing something. Snatching up the nearest axe he began to hew away at the rocky sides, doubtless reinforcing his actions with emphatic words. His example was contagious. Axes and hammers were brought — all the road tools had been lost in the unfortunate experiment at pontooning on the Gila River — and soon the solid rock was broken into enough to allow of the carrying through of the wagon bed, tilted on one side, followed by wheels, also tilted. The last two wagons only were taken through by the mules with their loads undisturbed.

The San Felipe Pass

On reaching San Felipe news was received that led Cooke to change his route and aim for Los Angeles instead of San Diego. It would be interesting to follow his tracks, but space forbids. He was thus kept for several days longer in the mountain region belonging to the Colorado Desert and had some experiences with the Indians.

Possibly the next memorable ride over the Colorado Desert was that made by Kit Carson in March, 1847, with Lieutenant Beale to Washington with dispatches. He had been on his way East on a similar message from John C. Fremont when he met Kearney and his army, and it was on the command of Kearney that he had allowed his companion to proceed with the dispatches while he returned as guide to the Army of the West. He and Beale had stealthily found a way through the sentinels of the Californians after the battle of San Pasqual and had conveyed the news of the sad defeat to the officers at San Diego. Hence Carson and Beale were both well equipped to make such a journey, and their mutual confidence made their association helpful and pleasant. Yet it should not be forgotten that Beale was at that time suffering from

a dangerous wound. He was so weak that for twenty days Carson had to lift him on and off his riding animal. It was not thought he could live, but when this first and most dangerous part of the journey was ended he had so far recovered as to be able to take care of himself. It was this Lieutenant Beale who was instrumental in having camels brought into the desert.

The Mexican War resulted in the seizing and holding of California and New Mexico by the United States and the purchase of Arizona. By the terms of the treaties both of Guadaloupe Hidalgo and the Gadsden purchase it was required that a boundary line should be jointly explored and run, and in 1850–53 John Russell Bartlett, with a competent corps of scientific assistants, performed that work for the United States. His chapter (XXVI) descriptive of the trip from San Diego to Alamo Mocho is most interesting. Before I proceed to give extracts, however, let me call attention to a mistake often made, even to-day, in this last name. It should be, properly, Alamo *Mocho*, not Mucho. Mocho means lopped or cropped, hence Alamo Mocho is the "Cottonwood with lopped branches." Alamo Mucho is "Many Cottonwoods." The well located here received its name from an old cottonwood, the branches of which had fallen or had been cut off for fire-wood.

Of the journey as far as San Felipe we have nothing now to do. The whole party embraced six wagons, twenty-five pack-mules, and about fifty officers and men, mounted. It was June 4, late in the afternoon, when they reached the San Felipe Pass where Cooke had hammered and cut his way through the solid rock. Now let Bartlett tell the story: "This defile consists of perpendicular walls of rock about fifteen feet high, and of a width barely sufficient for wagons to pass. In its bed are large masses of rock reaching to the axletrees. At the narrowest point one of the wagons stuck fast: but after taking out the mules, by dint of lifting and prying, we at length got through. The space here was but two inches wider than the axletrees of the wagons. There were also several steep and rocky descents where the wheels had to be locked and the wagons held back with ropes. This pass was not less than three miles in length; and should two trains meet here, it would prove a serious business for both.

"The descent into the valley beyond continued gradual for

several miles, but at length our course was stopped by a bold rocky hill running directly across it. This we ascended, over a very bad road; but bad as it was it was better than the descent, which was the most perfect breakneck place that a wagon ever attempted to pass. It was exceedingly steep, filled with large loose rocks, with an occasional perpendicular leap of three or four feet. I feared that our wagons would not hold together even if they escaped being upset. But the only accident that happened was the breaking of the two remaining barometers, a very serious one for the meteorological observations.

"At the bottom of this hill we continued for five or six miles through a valley, with no other vegetation than the usual desert plants and cacti, accompanied by the great *agave* which seemed to luxuriate in this barrenness. At eleven o'clock P.M. we reached Vallecita, eighteen miles from San Felipe, where we pitched our tents among the willows.

A desert-worn animal

"June 3.—Vallecita, as its name indicates, is a little valley, surrounded by lofty and barren mountains. Pools of sulphurous water are found among the willow bushes, but not a tree was to be seen. The grass, too, had changed, having here a wiry character. A depot of provisions is kept at this place, with a file of soldiers, for the supply of Fort Yuma, and of government trains passing and repassing. A few horses are also kept here, to facilitate the communication between Fort Yuma and San Diego. The distance between those places is about two hundred and twenty-five miles, and Vallecita is about half-way. Beyond it, toward the Colorado, there is little or no grass, so that trains, after they have crossed the desert, usually stop a day or two here to recruit their animals."

Not liking the poor grass at Carrizo the mules stole away and returned to Vallecita and had to be brought back. When the party came a little nearer the desert they found "an innumerable quantity of the bones and dried carcasses of sheep." There

were thousands of them ly ng in piles within the space of a hundred yards. Undoubtedly this wholesale slaughter of innocents was caused by their traversing the desert and, after being three or four days without water, they could not be restrained from drinking themselves to death when they reached Carrizo Creek.

The major part of the traveling was done in the evening on account of the intense heat, the thermometers often registering as high as 110° to 114° Fahrenheit in the shade.

That evening, in order to overcome a steep sand-hill, ten mules had to be hitched to each wagon, and one of them was upset and rolled over and over to the bottom of the hill, smashing the medicine chest.

The "day's march" to Alamo Mocho was made through the night of June 6, and forty-five miles was traveled without a moment's rest. "In long marches like this with pack-mules it is not considered advisable to stop; for no rest can be given to the animals without relieving them of their packs, to do which and replace them would require at least two hours. If a pack-train stops without relieving the mules of their burdens, the animals lie down and attempt to roll, an operation which disarranges the packs and often does much injury. When there is grass and water it is well, on long marches by daylight, to rest an hour or two during the heat of the day. Feed and water at such times, with rest from their loads, afford much relief, but when there is nothing to offer the weary animals, it is decidedly the best course to hasten on and complete the journey, unless it is too long to be accomplished in a day.

"The desert here is a vast open plain, extending as far as the eye can reach on every side, except on the southwest, where a chain of mountains appears some thirty or forty miles distant." (This is the range now known as the Cocopah range.) "The undulations are few and slight. Near our camp was a steep bank about sixty feet high, extending for miles, and descending to a great depression or basin, which appears to have been the bed of a lake. It was in this bed that the wells or pits were sunk from which we obtained water."

This dry bed was undoubtedly part of the desert now known as the Imperial Valley.

The rest of the journey was over the same route taken by Cooke, and while one of hardship was similar in experience to that of all people who are venturesome enough to face this portion of the desert during the hot weather.

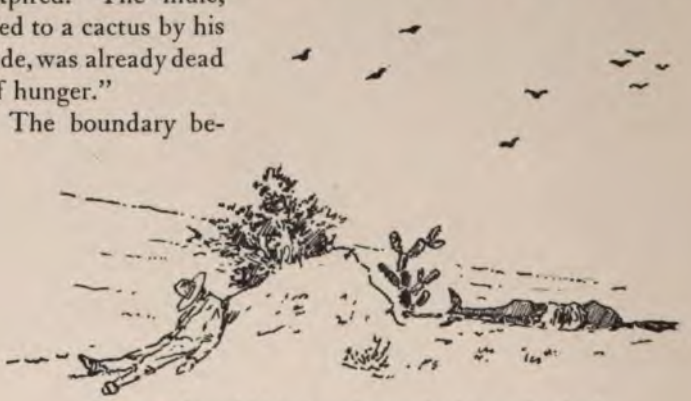
Of the gold seekers that poured into California in "the days of '49," many chose this southern route in order to avoid the high mountains and the snow. It is claimed that some 8,000 people entered the Golden State by this way, a few going to San Diego, but nearly all crossing the desert and reaching the mines either by way of Warner's Ranch or through the San Gorgonio Pass and Los Angeles.

It was at this time that the ferry was established at the Colorado River that laid the foundation for at least one large fortune; and from this period also date all the stories about men locating on the desert wells and water-holes and charging exorbitant rates for this absolute necessity of life and travel.

In his "Eldorado," Bayard Taylor speaks thus of the horrors of this desert route: "The emigrants by the Gila route gave a terrible account of the crossing of the Great Desert, lying west of the Colorado. They described this region as scorching and sterile—a country of burning salt plains and shifting hills of sand, whose only signs of human visitation are the bones of animals and men scattered along the trails that cross it. The corpses of several emigrants, out of companies who passed before them, lay half-buried in sand, and the hot air was made stifling by the effluvia that rose from the dry carcasses of hundreds of mules. There, if a man faltered, he was gone; no one could stop to lend him a hand without a likelihood of sharing his fate. It seemed like a wonderful Providence to these emigrants, when they came suddenly upon a large and swift stream of fresh water in the midst of the desert, where, a year previous, there had been nothing but sterile sand. This phenomenon was at first ascribed to the melting of snow on the mountains, but later emigrants traced the river to its source in a lake about half a mile in length, which had bubbled up spontaneously from the fiery bosom of the desert.

"One of the emigrants by the Sonora route told me a story of a sick man who rode behind his party day after day, unable to

keep pace with it, yet always arriving in camp a few hours later. This lasted so long that finally little attention was paid to him and his absence one night excited no apprehension. Three days passed and he did not arrive. On the fourth a negro, traveling alone and on foot, came into camp and told them that many miles behind a man lying beside the road had begged a little water from him and asked him to hurry on and bring assistance. The next morning a company of Mexicans came up and brought word that the man was dying. The humane negro retraced his steps forty miles, and arrived just as the sufferer breathed his last. He lifted him in his arms; in the vain effort to speak the man expired. The mule, tied to a cactus by his side, was already dead of hunger."



He was found dying, and near by his mule, dead

The boundary between Mexico and the United States duly determined, Jefferson Davis, then Secretary of War, prevailed upon Congress to authorize, March 3, 1853, explorations for a route for a railway from the Mississippi River to the Pacific Ocean. The geologist of that party was Professor Wm. P. Blake, now of the University of Arizona, and his report is full of interesting experiences and descriptions. To him is due the naming of the desert "the Colorado," as prior to his time it was referred to merely as the desert. Owing to an error afterward corrected, Mr. Blake's report confuses the two great ranges and peaks. It speaks of the San Bernardino on the north and the San Gorgonio on the south of the pass. The fact is that both of

these peaks are in the Sierra San Bernardino on the north side of the pass, and the mountain to the south is San Jacinto, the range of which here commences. It continues in a southerly direction over the Mexican boundary, where its offshoot, the Cocopah range, begins, and then forms a prominent feature of the scenery of Lower California. Professor Blake and the surveying party, under Lieutenant Parke, traveled over the route we are now growing familiar with to Carrizo Creek, and over the San Felipe Pass to Warner's Ranch. Then returning they took the Kearney and Cooke route to the Colorado River.

Blake in his report tells of traveling from the Big Lagoon to Alamo Mocho. "A mile or two beyond the Big Lagoon we came to the edge of another and smaller one, called the Little Lagoon.

The way the pioneers crossed the desert

It is much like the first, except that it is bordered with mesquite trees, which, in some places, grow very thickly together. We passed two canal-like channels, or wide gullies, in the surface, with mesquite trees growing in the bottom, and evidences of the presence of water at a former period. . . . These channels probably communicate with the two lagoons, and may be the bed of the stream called New River, so called from the fact of its sudden appearance in 1849. At that time the Colorado River was very high, and broke over a part of its banks between the mouth of the Gila and the head of the gulf. The water flowed inland, running backward through the desert toward the center of the valley once occupied by the ancient lake."

The emigrants of 1849 were much delighted and relieved to find this river, though Major Emory in 1846 does not mention it.

There is no doubt whatever but that it has existed ever since the Colorado Desert was formed, subject of course to many and various changes of channel, course, and level. Through it the overflow waters of the river reached the lagoons — what we now call the Salton Sink.

One of the strangest sights ever witnessed on the Colorado Desert was when a drove of camels crossed it in going from Fort Tejon to Albuquerque. Owing to the heat of the desert, the scarcity of water and feed, and the hostile nature of the Indians, the difficulties of transcontinental transportation were such as to daunt any Secretary of War, and for several years efforts were made in Congress to obtain an appropriation for importing a drove of camels for transportation purposes. Jefferson Davis was largely instrumental in finally obtaining the appropriation in March, 1855. A herd of thirty-three animals was bought in Africa, — nine dromedaries or runners, twenty-three camels of burden, and one calf. Among them were two two-humped Bactrian males for use in breeding with the Arabian female. Six Arabs, one of them a Bedouin of the desert, and a professed camel doctor, came over with the herd, which was successfully transported from Smyrna to Indianola, Texas, where they landed May 14, 1856. After a few days' rest they were marched by easy stages to San Antonio and thence to Green Valley, sixty miles farther on. Here they camped and experiments were made. One day, Major Wayne, who was in charge, sent three six-mule teams, with a wagon to each team, and six camels to San Antonio for a supply of oats. In going the camels were held back to accommodate the slower pace of the mules. Returning, the camels carried 3,648 pounds of oats, while the wagons brought 1,800 pounds each. Thus three camels were equal to six mules and a wagon, and, in addition, the camels came to camp in two and a half days, while the mules were nearly five days in covering the distance.

The great strength of the camel was demonstrated at Indianola. A number of people had expressed their skepticism as to the ability of the camel to carry heavy burdens, so Major Wayne sent for one of the best of the herd, and, having caused it to kneel, ordered two bales of hay, each weighing three hundred and fourteen pounds,

placed upon it. The knowing bystanders were convinced that the camel could not rise with such a load, but they laughed in scorn when the major ordered two more bales piled on, making an aggregate weight of one thousand two hundred fifty-six pounds. To the amazement of all, and to the utter confusion of the scoffers, the camel at the word of command easily rose and walked off with his burden.

Another herd of forty-one animals was bought and brought over by Lieutenant Porter, landing in Indianola, February 10, 1857.

In the fall of this year Lieutenant Edward Fitzgerald Beale was ordered to open a wagon road from Fort Defiance, New Mexico, to the eastern frontiers of California, and a part of the herd of camels was put at his disposal for this expedition. The journey occupied forty-eight days through an unexplored wilderness of forest, and plain, and desert, the Colorado River being reached October 18. Lieutenant Beale was most enthusiastic in speaking of the work performed by the camels on this arduous trip. He says that they saved the members of the expedition from many hardships, and excited the admiration of the whole party by their ability and willingness to perform the tasks set them. He started with the determination that the experiment should be most thorough, and subjected the camels to trials which no other animals could possibly have endured. On the desert they carried the water for the mules; traversed stretches of country covered with the sharpest volcanic rock without injury to their feet; climbed with heavy packs over mountains where the unloaded mules found it difficult to go even with the assistance of the dismounted riders; and, to the surprise of all the party, plunged into rivers without hesitation and swam them with ease. The lieutenant concluded that he would rather have one of the camels for such work than four of the best of his mules.

With such an introduction it is a source of wonder that the camels are not in use to-day. But adverse circumstances soon arose. The officers who knew how to handle the camels were transferred elsewhere, the mule drivers were incompetent to direct camels and unwilling to learn, and some of the creatures' supposed virtues were found to be vices. As J. M. Guinn writes: "He could travel sixteen miles an hour. Abstractly that was a virtue; but

when camp was struck in the evening and he was turned loose to sup off the succulent sage-brush, either to escape the noise and profanity of the camp or to view the country he was always seized with a desire to take a *pasear* of twenty-five or thirty miles before supper. While this took only an hour or two of his time, it involved upon his unfortunate driver the necessity of spending half the night in camel chasing; for if he was not rounded up there was a delay of half the next day in starting the caravan. He could carry a ton — this was a commendable virtue — but when two heavily laden 'ships of the desert' collided on a narrow trail, as they always did when an opportunity offered, and tons of supplies were scattered over miles of plain and the unfortunate camel pilots had to gather up the flotsam of the wreck, it is not strange that the mariners of the arid wastes anathematized the whole camel race from the beast the prophet rode down to the smallest imp of Jefferson Davis' importation."

The army horses and mules also were said to share the antipathy of the men. A camel was enough to stampede a whole herd, but this, as well as the other objections, could have been overcome easily had some officer had charge with intelligence and interest sufficient to teach the men how to handle the African animals.

When the Civil War broke out the camel proposition was almost forgotten. The herd was distributed among strangers who reported more and more adversely upon them. Finally orders were issued and the herd sold, most of them doubtless finding their way into menageries and zoölogical gardens. A few, however, escaped, and ever since there float in occasional reports of one or more camels having been seen on the deserts of Southern Arizona.

As a preliminary to the building of a railway a stage line across the desert was started in August and September of 1857. The San Antonio and San Diego semimonthly stage it was called. I. C. Woods was its founder and James Burch acted as contractor.

This continued for a year, when the Butterfield Stage-coach Line was inaugurated, semiweekly, under a six years' contract with the Postmaster-General at six hundred thousand dollars a year. In another chapter I give an account of the ride across the desert. The route reached from San Francisco to St. Louis, and the traveling time was generally from twenty to twenty-two days. On

special occasions, as the transmission of a presidential message, it has been done in sixteen.

Of all the later travelers over the desert none has written so vividly and interestingly as Clarence King, who, in his "Mountaineering in California," tells of the trip he made from La Paz, in May, 1866, to San Bernardino. Of the desert he says it "lies under the east slope of the great chain, and stretches eastward sometimes as far as five hundred miles, varied by successions of bare, white ground, effervescing under the hot sun with alkaline salts, plains covered by the low, ashy-hued sage plant, high, barren, rocky ranges, which are folds of metamorphic rocks, and piled-up lavas of red and yellow colors; all overarched by a sky which is at one time of a hot, metallic brilliancy, and again the tenderest."

In 1881–84 the lines of the Southern Pacific railway were laid, following in the main the survey over the desert made by the government in 1853. Since then most of the travel has been in comfortable, nay, luxurious cars, save to the miner and prospector who venture still into the secret places, the inner heart of the desert. While tardy county and state officials are at length bestirring themselves to do a duty that should have been done long ago, in the digging of wells and erection of sign-posts, there is still enough of danger to give the spice of hardship and adventure to those who seek it. The winds blow over the faint and uncertain trails, the moving sands either leave or cover them, the rains and cloud-bursts wash them away, and the fierce sun of midsummer beats pitilessly down upon them to-day as relentlessly and exhaustingly as when the first explorer set his foot in this wonderful region.

View of the desert from the "Hidden Lake" trail on San Jacinto Mountains

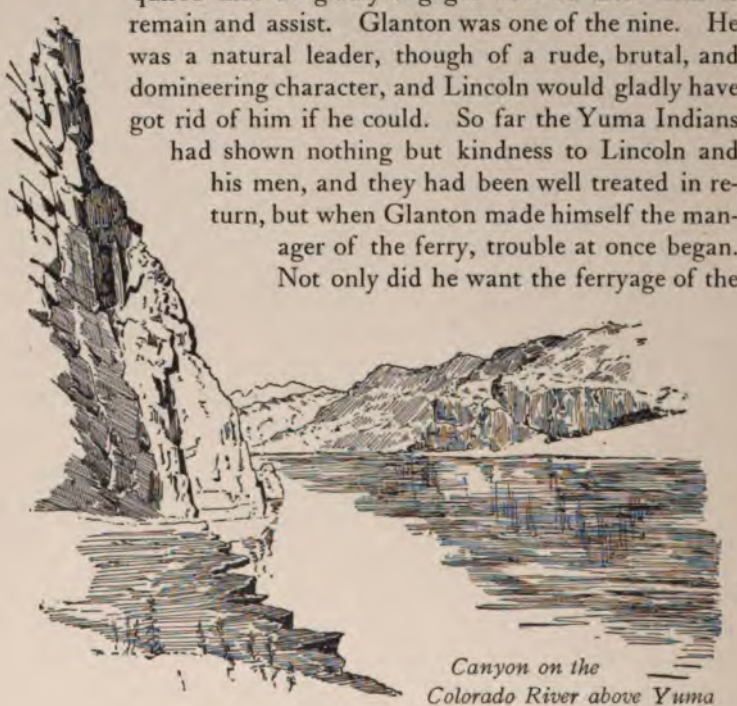
CHAPTER VIII

The Colorado River Ferry

UNTIL after the discovery of gold the first ferry established on the Colorado River was run by Indians. A General Anderson of Tennessee is said to have gone from Tucson to California, and on reaching the Colorado River built a boat for the purpose of crossing his company. He then presented the boat to the Yumas and gave them a certificate to that effect, on condition that they would cross all Americans at one dollar for a horse, one dollar for a man, and one dollar for the cargo (a pack), and that upon a violation of this contract by any higher charges than these the boat should be forfeited. The Yumas for a while plied this ferry at what was called the lower crossing, some four or five miles below Yuma, reaching the California bank near where Hanlon's ranch now is, or the upper end of the Algodones ranch. This was in the latter part of 1849 and early in 1850. The Indians seem to have kept their part of the contract faithfully. In the records of the time there are few complaints of ill treatment by the Indians and none, that I can find, about the ferry.

It was natural, however, that some thrifty white man should look upon this ferry with envious eyes when the Sonoranian immigration to the California gold-fields began. And it was left to Dr. A. L. Lincoln, a relative of the martyred President, Abraham Lincoln, to be that white man. He had come to California in 1849, and early in January, 1850, returned to the Colorado River. The possibilities of a ferry run by a white man appealed to him, but, not wishing to seem to interfere with the Yumas, he established his ferry at the junction of the Gila and the Colorado. This was a wise move, for the greater part of the immigrants came down the Gila and thus reached the Colorado first at this point.

The Sonoranian migration to the gold-mines was then at its height, and the ferry proved to be a most profitable undertaking. On the twelfth of February a man named Glanton, with a party, mainly of Texans and Missourians, came to the ferry, and although Lincoln then had six men in his employ, such was the work required that he gladly engaged nine of these men to remain and assist. Glanton was one of the nine. He was a natural leader, though of a rude, brutal, and domineering character, and Lincoln would gladly have got rid of him if he could. So far the Yuma Indians had shown nothing but kindness to Lincoln and his men, and they had been well treated in return, but when Glanton made himself the manager of the ferry, trouble at once began. Not only did he want the ferryage of the



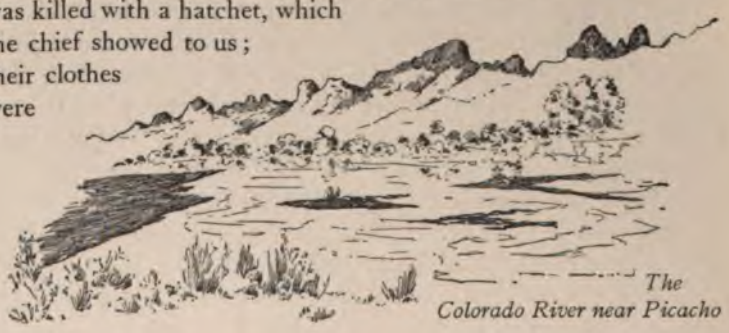
Canyon on the Colorado River above Yuma

American travel that came by the Gila, and thus cut off that source of income to the Indians, but when he learned that many Mexicans had crossed and were crossing by the Indian ferry he became furiously angry. The Indians then claim that he sent his men down the river where they destroyed the Indians' boat, captured an American whom they found helping the Indians, with all his money, and that when Glanton saw and talked with the American he shot him and threw his body into the river. The chief of the Yumas said he then went to see

Glanton and made an offer that Glanton should cross all the men and baggage, while the Indians should cross the animals of the emigrants, and thus they would get along quietly. With a spirit that is not unusual even in this our day, Glanton repudiated such an offer, kicked the chief out of the house, and beat him over the head with his stick.

The chief then called a council of his people and it was determined to kill Glanton and all the Americans at the ferry. From the deposition of Jeremiah Hill, sworn to in Los Angeles, May 23, 1850, these facts are gathered. It was found that Glanton had gone to San Diego. On his return, the chief who had been insulted went to the ferry and found Glanton and his men drinking. They gave him something to eat and also some drink. After dinner, "five of the Americans laid down to sleep in a hut, leaving him sitting there; others were ferrying, and were on the opposite side; three had gone up on this side for some purpose. The chief said he watched till he thought the five were asleep, when he went out to his people on this side, who were all hid in the bushes just below the houses; a portion of them he sent up after the three Americans who were cutting poles, instructing his men to get possession of their arms. He had previously posted five hundred Indians on the other side, instructed to mix among the Americans and Mexicans, and get into the boat without suspicion. He himself then went up on the little mound perhaps as high as his head, but commanding a view of all his Indians, and the whole scene; from this mound he was to give the signal. There he was to beckon to those hid in the bushes to come near the American tents, which they were immediately to enter and give a yell as they killed the Americans, whereupon he was to give the sign with a pole having a scarf on it to the Indians on the other side as well as those who were watching the three from above. He gave the signal, when those in the boat and at the houses were all killed. The Indians who had been sent after the three Americans ran, but these three succeeded in getting into a skiff and escaped by going down the river. His men pursued on the shore, on both sides, but several were killed by the Americans, and many wounded. He showed us two of the wounded, and when asked if 'as many as ten' of the tribe were killed he said, 'More.' He said one of the

Americans would row while the others fired, and his people hesitated to pursue further. When the chief went up to see Glanton, as above stated, about the ferry, Glanton said that he would kill one Indian for every Mexican they should cross. He showed us by signs the amount of money in bags which he took from the Americans' camp. It seemed from his description to be about three bags of silver, each about three feet high, and about two feet around, which must have contained at least $80,000, besides a bag of gold, about a foot high and a foot round. This he said he divided amongst his people, then burnt the houses over the bodies of the dead. The six who were killed in the boat were thrown into the river as fast as they were killed, all killed with clubs. The five on shore were killed with clubs except Glanton, who was killed with a hatchet, which the chief showed to us; their clothes were



The Colorado River near Picacho

burnt, and perhaps their flesh somewhat burnt by the burning of the little shed of brush in which they had been killed; their bodies were then thrown into the river. After giving this account of the transaction, the chief said that, upon the death of these Americans, another council was held as to whether they should kill all Americans who should come along, at which it was resolved by every Indian that they would. He said that in two days they could muster 4,000 warriors; he said their arms were principally bows and arrows and clubs; and that they had a few guns, including all the arms they got from Glanton's party, but that they intended to collect all they could from every source."

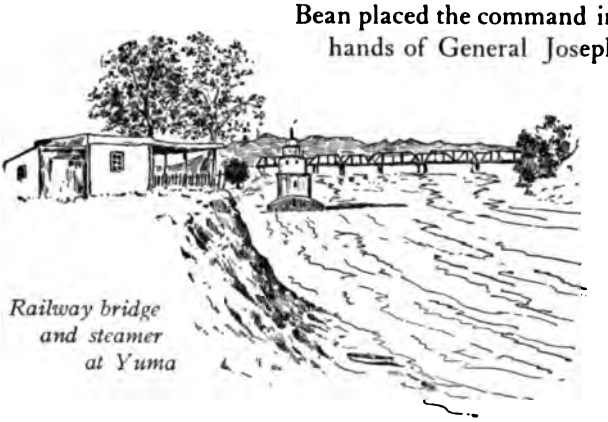
The three Americans escaped and reached San Diego in safety. As they passed New River they saw two Yuma Indians who in-

Photo. by H. C. Tibbitts, San Francisco, Cal.

TAUQUITCH CANYON AND SAN JACINTO MOUNTAINS, NEAR PALM SPRINGS, COLORADO DESERT

formed them they were on the lookout for any Americans who might come from San Diego to fight them. They were hostile to the whites and wanted them to know it.

At this time it was supposed that fully seventy-five to one hundred American men, women, and children were on the way to the Colorado, coming down the Gila River. This and the fact of the massacre led Governor Burnett to order the sheriff of Los Angeles to enroll forty men, and the sheriff of San Diego twenty, to be placed under the command of General Bean of the state militia and to proceed at once, punish the murderous Yumas and reduce them to a proper state of mind toward traveling Americans. General Bean placed the command in the hands of General Joseph C. Morehead, who delaying his preparations, found the people of Los Angeles unwilling to furnish supplies for his scrip, alleging that the alarm had subsided. The gallant general then seized by force what was required, paying by drafts on the state treasury at an extravagant price, and set out with forty men and supplies for a hundred over the desert. That was a wild and boisterous march. Meeting emigrants on the way the force was increased to one hundred twenty-five, and these rough and turbulent spirits, with full rations, more liquid than solid, marched to the reduction of the Yumas. The Indians fled up the river at their approach, but they were not pursued. Morehead and his men settled down to a fierce attack on their rations and kept it up until the governor ordered an immediate disbandment. The order was disobeyed on the ground



Railway bridge and steamer at Yuma

that the traveling bands of Americans still needed protection, but when it was repeated in most peremptory fashion the "force" retired. This adventure did not one particle of good and cost the state $120,000, $76,588 of which was for the goods purchased by Morehead and the balance for the forceful levies he had made.

This trouble led to the establishment, the following November, of Fort Yuma, and Major Heintzelman, who had been stationed at San Diego, was made commanding officer. Either by his direction or under his protection a party left San Diego in May, 1850, fully equipped to build and operate ferry-boats at the crossing where Lincoln and Glanton had lost their lives. This ferry was successfully operated for a while and then it came to the hands of Diego Yaeger, who, for many years, continued to operate it. Yaeger was a German by birth and also a born frontiersman, with all the thriftiness of his race. He made a good thing out of the ferry. The military had to cross and recross, and they also had to purchase large supplies of beef, beans, vegetables, and animal forage. And need it be added, that the military at this desert post were glad to have an obliging capitalist close at hand who could and would, for a consideration, "help them out" when funds were short, "until next pay-day"? Suffice it to say that the ferry of the Colorado, with its perquisites, made a fortune for the German frontiersman.

To-day the ferry is still there, but with the opening of the Southern Pacific railway in the early '80's it has ceased to be of a highly remunerative character.

CHAPTER IX.

Storms, Mirages, Desert Illusions, and Temperatures

THE Colorado Desert is no exception to other deserts in its liability to storms. The peculiar topography of the desert and its surrounding country indicates its possibilities in this direction.

About midway between the Colorado Desert and the Pacific Ocean stands the gigantic mountain barrier of the San Bernardino and San Jacinto ranges, with an elevation of from 9,000 to 11,000

A settler's home on the desert

feet. At the point of junction between the two ranges, with an elevation of but 2,808 feet, is the San Gorgonio Pass. On the west side of the pass the fertile valley of San Bernardino and Santa Ana slopes down to the sea, and on the east side the rugged boulder-strewn slope leads to the hot, dry, sandy bowl, 287 feet below sea-level, of the Colorado Desert. Temporarily portions of this bowl are filled with water, the Salton Sea, but this is a condition of less than a year's continuance, and

ere another year is gone may again have reverted to its normal condition of dryness. Between the head of the pass and down as far as Mecca the verdure has grown wonderfully in the past four years, owing to the discovery of artesian water, and south of the Salton Sea the Imperial Valley has also produced a large amount of crops as the result of irrigation. Yet it is nevertheless true that a tremendous area both of flat sand-plain and rocky mountain slope and the trench-like valleys between are practically verdureless and therefore act as vast reflectors of the heat of the sun. During the daytime, when the sun shines directly upon these radiating surfaces, the heated air arises in great volume. Whither shall it go? To the east similar columns of hot air are ascending from the Arizona deserts, and northward from the Mohave, while to the south there is only the comparatively narrow passageway of the Gulf of California. Air must conform to natural law the same as water, and while it is capable of compression (as is water), it will seek an outlet before yielding to much pressure. This outlet is found over the western range (the San Jacinto) where, passing over to the Pacific Ocean, it is quickly cooled and ready for its return passage. For, on cooling, it descends, and, feeling the suction caused by the ascension of air on the desert, it rushes in to fill up the vacant spaces. Reaching the range of mountains it ascends again here to come in contact with the ascending hot column from the desert. The suction, therefore, is tremendous at such places of low level where there is a pass over or through which the cooled air may flow. The San Gorgonio Pass is the largest and most accessible of these passes, and through it the air flows with great force. The high walls of the pass may be regarded as the pump, while the desert acts as the suction valve, compressing and drawing the air toward it at the same time. The result is the wind blast before referred to that bends the trees over toward the southeast and that may be relied upon most of the days of the summer months.

Two interesting series of phenomena owe their existence to this blast. It is not an ordinary shifting breeze, but a constant and powerful current sweeping through the pass with such violence that myriads of fine grains of sand are lifted from the

dry channels of the streams and the ever-shifting masses of mountain detritus and are carried along, down the slope, until they find a resting-place on the desert. Just above and below Palm Springs station one may see the effects produced by this lifting up of the sand by the wind. Wherever there is a tree, or a bush, or a tiny plant in the path of the blast the sand particles on the upper side are lifted up and carried away so that often the whole root of the plant is exposed. The space between plants is swept as clean and smooth as if one had gone over it with a sweeping machine that could adapt itself to the irregularities of the heavier rocks and pebbles and pick up only the sand. On the lower side the particles seem to cling and arrange themselves in a peculiar shape, long and tapering to a point, the base resting at the stem and with its size determined by the size of the plant.

Moving sand-hills near Indian Well

Many large rocks have their recumbent, tapered, half obelisk or cone of sand made in like fashion. Professor Blake says that "the movements of sand in the air are precisely similar to those that take place when it is immersed in the more dense fluid, water. The progress of the grains along the surface of the plain, and their final rest at the edge of the bank, is precisely similar to the transportation of sand by a stream, and its deposition, in the form of a bank, whenever the current enters deep water. In water little eddies and back currents are produced by a projecting rock, or root, acting as a barrier to the current, and drift-sand accumulates on the lower side of such obstacles. So, in air, wherever a slight obstacle, such as a bush or boulder, stands on the plain, exposed to the wind, the driving sand accumulates on the lee side."

Another phenomenon owing its existence to the sand blast

is found in the smooth, even glassy polish attained by the telegraph-poles. Many of the ties and bridge timbers look "as if some industrious Dutch housewife had washed and scrubbed them with soap and water, until they resemble in their whiteness the boards of her own kitchen floor. Glass bottles, left for a short time on the ground, lose their original appearance, and are ground inside and out." The most striking effects, however, are seen on many of the rocks below the pass and elsewhere, which are polished and smoothed or cut and bored into remarkable shapes. The limestones subject to this sand attrition have a peculiar, rounded and smooth surface, which resembles that of partly dissolved crystals, or deliquescent specimens of rock salt.

The homogenous granites have long grooves cut into their surfaces, deep enough to receive a lead-pencil, and the granites of unequal hardness present most interesting results. The

A wind-storm in the desert

abrasion being most rapid upon the softer feldspar, the masses of quartz, tourmaline, and garnets stand out in relief, or, where the harder rock faces the wind with the feldspar behind, it is worn away to a point, similar to the sand behind the bushes.

Vertical surfaces of rock exposed to this sand blast are cut in curious fashion. The harder masses act as a protection for the softer feldspar, beneath which it is chiseled and cut into tiny columns, upon which rest, as caps, the quartz. Where the feldspar is charged with small garnets, and is directly in front of the wind, the garnets are left standing in relief, mounted on the ends of long pedicles of feldspar, — jeweled fingers, pointing in the direction of the wind.

Sand-storms on the desert! What a feeling of terror comes over us when we read or even think of a storm of this character overtaking the desert traveler! There are sand-storms *and* sand-

storms, and I have experienced several kinds. It is no uncommon thing to see the sand carried along into the atmosphere so that the sky is largely obscured, but that need not be attended with more than trifling discomfort. But when the very atmosphere itself seems made of sand, so that every breath you breathe fills mouth, nostrils, bronchial tubes, and lungs with the tiny yet distressing particles, and when, in addition, the sun's fiercest rays are condensed by this sandy atmosphere as through a lens upon the hapless traveler beneath, so that he is almost suffocated by the heat, which is made more intense by the scorching character of the wild wind itself, then one knows to the full the real terror of the desert, the demon in all his fury, the archfiend that is worse than Death. It is generally easy to tell when the storm is coming. To a heavy sultriness of atmosphere is added a feeling of tenseness as if everything were gathering itself together ready to make a spring upon you. The very intensity of the feeling unnerves you and deprives you of the power to resist the coming onslaught. The horses, burros, and mules are restless and uneasy. They whinny and whine and whimper in their semi-articulate way trying to voice their sense of the distress in store for them. The palms are as silent and still as if they held their breath. Everything is still and motionless. Even the coyote knows enough to seek and keep shelter when the desert is thus tightening its muscles for the conflict.

Then, suddenly, the wind comes. In a moment the palms wave their tufted heads like green billows in an angry sea, and their voices fill the earth as the roar of the waves fills the sea. In the distance the sand-waves come, reaching from the face of the desert to the very zenith. Rolling and tossing, reaching out waving arms with fiercely clutching fingers as a mad demon of frightful size and power bent on destruction, they dash along. The sky is filled with bloody gold, and the sun has red instead of gold in its blood. As soon as the storm reaches us we are immediately enveloped as in a hot mist of dry sandy air. No arrangement of words can equal the concentration of misery and wretchedness one feels at such a moment. At first one is utterly blinded, staggered, stunned. Gasping for breath, whirled about, buffeted, even thrown down, he knows not what has happened, what is

happening, what is going to happen. As soon as eyesight is gained the animals are found huddled together, their tails turned to the fury, which now roars as an intermittent furnace. It is as if the demon were trying to scare and stifle you at the same time. Parched, one takes a sip from the canteen, and hearing the low moaning of the animals, he feels their wretchedness. They, too, are suffering for water. But to give it in a bucket is impossible, and experience has taught me not to try to do so. I pour it into a bottle and then, throwing the animal's head back, pour the warm fluid down its throat. It is neither satisfying nor refreshing, yet it seems to meet some demand. Hour after hour the heat pours down, drying every particle of moisture out of you it can capture. You feel you are drying up, and yet the water you

Part of the great sand-hills

drink gives you no relief. The sand fills everything, — eyes, ears, nostrils, mouth, clothes, pockets, are full of the tiny, hot particles. To breathe is a distress, to eat impossible. The animals lie down and writhe and groan in their helpless distress. In pity for them I have wrapped up their heads in canvas, and they seemed to comprehend I was doing it for their relief.

For such a storm to last an hour is a fierce distress that seizes a strong man with such a grip that though he is a fighter through and through, he almost cries out for relief. To suffer it for two or three days is a maddening torture. Three times I have experienced this kind of a storm.

Yet summer storms of this nature are far rarer than the fierce storms of winter. Then the sultry heat gives place to piercing

cold that cuts through and through you as a stabbing dagger. It is as if all the heat of summer had suddenly been converted by magic into biting cold, and the hot blasts of the scorching sirocco exchanged for a frozen wind from the ice-fields of the Arctic.

The one is just as dangerous as the other; the unwary traveler on the desert is liable to perish in either. Their rarity is their chiefest comfort, and their entire absence the only blessing they can confer. Familiarity with them does not breed contempt, nor do they improve on acquaintance. One dare not speak disrespectfully of them, so even now I have stood up and turned around, making the needful signs, — as many people do when speaking of the devil, — that when I next go on the desert I may not be punished for my temerity and disrespect.

Of one phase of a desert storm I have not yet spoken; that is its fury where the hand of man has made an oasis. One has often watched the fierce waves of a storm-tossed sea leap with wicked anger upon the land. So the winds of the desert leap upon the trees and verdure and houses that the oasis has planted upon the desert's bosom. It is the jealous rage of an exacting and vengeful lover. It comes like a foaming tide that strikes and then surrounds, falling back to gain new strength to strike again with renewed power, roaring and eddying, dashing and clamoring, taking the tall trees as in giant hands and bending them over toward the ground. It slams the doors, rattles the casements, and sometimes carries away the roofs of the houses of the proud, strutting creatures called men, who build these places as their shelters. When they enter them, and close the door upon the battling storm and then gaze upon its fury through the windows, wearing a smile that seems to sneer at its impotence and anger, how can the Desert Demon contain itself? It must destroy this pygmy, puny creature. It must drive him forth from the home of its beloved, where, hitherto, it has reigned supreme. And with renewed vigor and force, with unquenchable anger it lashes itself into new fury and continues the attack.

Inside the house the wind and sand penetrate, the latter covering everything with its pale gray pall, the former shaking and fluttering every piece of hanging drapery, lifting up the rugs and carpets as if some uneasy spirit were confined in them that

wished to escape and join the army of tossing, torn and misshaped things outside that were being driven headlong by the fury of the storm.

Can one be in or gaze upon such a storm and not feel all the peace he has gained on the desert disappear? Most certainly! To me the storm is clarifying, purifying. I have no resentment against the storm that even beats me down and compels delay and produces great discomfort, weariness, distress. David knew what the heart soon learns, viz., that even the "stormy wind fulfils His word." God is as surely in the fire and whirlwind, in the storm and the tempest, as in anything, and he only can find constant, secure peace who *knows* that there is no storm outside of God.

The faint roads and trails on the sandy portions of the desert are

A desert graveyard

often entirely obliterated by the sand-storms. Either the sand is bodily transferred by the wind, thus leaving not the slightest trace, or the road is covered by the sifting sand and thus disappears. The results to the traveler, unless he be very familiar with the desert, are equally disastrous. It is bad enough to be on the desert in stormy times with well-defined roads and trails, but to have them obliterated always means distress, often disaster, and sometimes death.

Fortunately sand-storms are not too prevalent. March, as elsewhere, is the month of bluster and wind, and then the blasts from the north and west coming over the snow-clad summits of San Jacinto and San Gorgonio are cold and piercing. I have often slept out of doors in late March and the winds have been both piercing and cold at that time.

The heat waves on the desert produce most astonishing optical illusions. I have a lady friend who has taken up a desert claim.

She was once riding along in the heat of a summer's day, the whole face of the desert palpitating and vibrating with the heat waves, when, suddenly, in the distance, her eyes fell upon a moving object that was so large and singular that it instantly filled her with inconceivable terror and dread. Here, visible to her own eyes, while she was as calm and sane and in full possession of all her faculties as she ever was, a monster sea-serpent was approaching her. It seemed to be fully a quarter of a mile long, and it came toward her, humping itself in sections exactly as an inchworm or caterpillar humps itself in traveling. It was no illusion! It was a serious fact. The thing was coming, silently, stealthily, but really, positively, actually. For a few moments the poor woman was absolutely petrified with such a fright as she had never felt in her life. What could she do? Fly? That was useless, for the creature was approaching with a speed far greater than her old and weary horse was capable of. In her horror she sat still, incapable of decision or action until the object itself relieved her of all fear. It was a freight train of very great length, coming on the track alongside of which she was driving, and the heat waves vibrating over and upon it had produced the optical illusion. The air vibrations also had the further effect of magnifying the cars so that altogether it made a truly terrifying spectacle.

I have seen the same phenomenon many times. It is startling and horrifying even when one is used to it, so much so that one laughs at his own dread as soon as the train has time to correct the impression of fear the startling object immediately creates.

The track-walkers tell me that when they first saw the tracks humping up and down in this same fashion they were sure an earthquake was approaching and stood breathless, waiting for the awful and destructive shocks, which, however, never came.

I remember on one occasion going with the section-men on their "pump car" to Salton. As we approached the station the salt-works were "without form and void." It is impossible to put into words the peculiar appearance they presented. One could see some object in the landscape, but it was not stable, and it was of no recognizible shape. It was a nonesuch. It was

in constant movement as if under the influence of an earthquake that shook with rhythmic movement, up and down, across and lengthwise, simultaneously. It was the most singular looking object I think I ever beheld in my life, and the movements were weird and strange beyond any description. I thought I knew everything in the locality, but this certainly was novel and strange. As soon as I could I went to investigate and to my utter amazement, as soon as I got near enough to dispel the effect of the heat waves, I found it was nothing but the buildings of the salt-works. The thermometer registered 115° Fahrenheit in the shade.

The most famous as it is perhaps the best known and least understood of all desert illusions is the mirage. The poet Moore

Mirage. Inverted mountains in the sky

could think of no more miserable doom for the traitor than to invoke the judgment of Heaven upon him in the mirage:

> "May he, at last, with lips of flame,
> On the parched desert thirsting die,
> While lakes that shone in mockery nigh
> Are fading off, untouched, untasted."

A thousand and one different mirages have been described, but, after twenty-five years of experience on several desert areas, I have come to the conclusion that while the mirage is most wonderful, the general descriptions are often the work of a vivid imagination which heightens and enlarges upon that which it sees.

Clarence King, however, describes the Colorado Desert mirage with truth: "In the indistinct glare of the southern horizon, it needed but slight aid from the imagination to see lifting and

tumbling of billows, as if the old tide were coming; but they were only shudderings of heat. As we sat there surveying this unusual scene, the white expanse became suddenly transformed into a placid blue sea, along whose rippling shores were the white blocks of roofs, groups of spire-crowned villages, and cool stretches of green grove. A soft vapory atmosphere hung over this sea; shadows, purple and blue, floated slowly across it, producing the most enchanting effect of light and color. The dreamy richness of the tropics, the serene sapphire sky of the desert, and the cool, purple distance of mountains were grouped as by miracle. It was as if Nature were about to repay us an hundred-fold for the lie she had given the topographers and their maps.

"In a moment the illusion vanished. It was gone, leaving the white desert unrelieved by a shadow; a blaze of white light falling full on the plain; the sun-struck air reeling in whirlwind columns, white with the dust of the desert, up, up, and vanishing into the sky. Waves of heat rolled like billows across the valley, the old shores became indistinct, the whole lowland unreal. Shades of misty blue crossed over it and disappeared. Lakes with ragged shores gleamed out, reflecting the sky, and in a moment disappeared."

The following descriptions were written at the moment of observation and in every case confirmed by my companions.

A common mirage often seen is of a long spit of land, covered with trees and set off with water which shimmers and glistens between the land and the observer. Again and again from Frinks and elsewhere have I observed this, the land spit lined with water, reaching out apparently for miles into the desert beyond.

Here is a large and beautiful sheet of water dotted with tiny islands reaching from a volcanic butte to the Cocopah range, miles away, completely covering land that I walked over a week ago and which I must traverse this afternoon. Did I trust only to my observation I could swear that this is indeed water, for to the right of this same butte is the Salton Sea that I know is water, and save for the fact that the "mirage water" is of a lighter hue than the sea, one is just as clear and distinct to the vision as the other.

Standing in the center of the track and looking up or down between the rails, water often appears to flood them as far as the eye can see. This mirage is many times accompanied by a slight mistiness above, as of smoke or steam arising.

Oftentimes the mirage from the southeast side of the desert looking southwest will have the appearance of an arm of the sea flowing smoothly and easily up to the bases of the Cocopah Mountains. All the intervening country is a vast, placid, rather lifeless, yet apparently real and genuine ocean.

Where I now sit writing (March 29, 1906) in my boat, anchored up a small slough on the east side of the Salton Sea, I can see three distinct and separate water mirages that no eye can possibly discern the falsity of. Here to the left and behind me is the genuine Salton Sea, the whole contour of which I have studied in many hours of wearisome rowing; to the left, well up in the foot-hills of the San Bernardino range toward Yuma, are the curving shores and tiny bays of another Salton Sea, while to the right below Signal Mountain in Mexico the Cocopah range is split up into small sugar-loaf islands, dome islands, and patches that remind me of Nantasket Island more than anything else, with a vast lake lying in the whole basin beyond the Salton to the mountains. The other sea is between these two on the alkali flats that separate the real Salton from the mirage Salton. It is peculiar white water, with dancing waves scintillating in the afternoon sun.

I have a friend who assures me that on one occasion he and a party of strangers were on the desert in the middle of summer, when the heat waves combined with the mirage produced most peculiar effects. One member of the party had never seen a mirage. When the phenomenon appeared he was surprised beyond measure. The mirage took on the appearance of a vast sea, and the vibration of the heat waves gave a vivid resemblance to white-capped breakers rolling in upon the shore that made the illusion perfect. The stranger expressed astonishment at the presence of the ocean. He "thought it was on the other side of the mountains." When told that it was a mirage, an illusion, he was grossly offended, and thought his companions were making fun of him. Couldn't he believe his own eyes? Had he not seen the ocean often enough to know it when he saw it? Just then an

added illusion came in the form of that which he took to be a schooner, and in triumph the believer called upon the unbelievers to see the vessel. Did not this prove his contention? Did imitation or mock vessels come on an imitation or mock sea? There was the ship, and, ah! there were others, and breakers, and the shore, and trees beyond, and houses, all of which confirmed him in his belief. And not until the mirage finally disappeared would he believe that he had been deceived.

Mirages are not always the effect of heat. I have often seen mirages in the cool of the early morning, when the desert sky was completely overcast and not one ray of direct sunshine anywhere. Even now, as I write, the conditions are like this, yet far to the south, seen between the lava piles south of Volcano station, is a great sea in which the Sierra Prieta bathes, while the upper end

A desert mirage

of the Cocopah Mountains is cut up into islands and long spits of land on which trees are growing, and between us vessels are moving to and fro. The same condition exists at the southern end of the Cocopahs — as far as visible—the whole of that end being lost completely in the mirage-like effects which cut up the range into islands and gigantic mushrooms that seem to remain supported by most slender stems.

This peculiar style of mushroom mirage is to be seen almost daily on the Colorado Desert anywhere south of the Indio. Volcanic piles that stand out isolated on the desert floor are slowly transformed from solid masses with broad bases anchoring them to the earth to shimmering, tottering, purplish mushrooms and toadstools of gigantic size, oftentimes of irregular round shape, sometimes perfectly round, but more often to a somewhat regularly shaped gigantic cigar, each end of which rests on "mirage water" which glistens and shimmers in the desert sun.

On the early morning of March 29, as we rowed across the south end of the Salton Sea, the whole San Bernardino range toward the east offered us an ever-changing panorama of mirage effects. My companion and I both saw it at one and the same time. He cried out as I was about to do so, "Cantilever bridge and structural ironwork!" It verily appeared like a vast cantilever bridge, with somewhat irregular steelwork, but clearly defined, connected with a vast extension of piled-up steel columns that reminded one more of the steel-framed sky-scrapers of New York in the process of construction than anything else.

One afternoon, looking toward the southeast where I knew the tops of the great sand piles of the old sea beach alone could be seen, we were treated to a series of mirages of singular delicacy of color and grace of outline. The color was of straw, or with a very delicate tinge of salmon, and the shapes were of trees, of varying forms and varieties, but all swaying to and fro in the breeze.

The mirage is an optical delusion, yet it seems real. I often feel as I gaze upon it that it is a type of one side of mankind. People look at their fellows, and think they see certain things. They imagine palaces and temples and towers and lakes and bubbling fountains. When they come nearer they find out their mistake. These things were delusions; there was no reality in them, and the disappointed go away and refuse to see the good in their fellows because all they imagined is not also there. The question then arises: Is the ground on which the mirage appears responsible for the mirage? Is it to be condemned because it does not fulfil all the promises of the mirage? Scarcely. Then should the disappointment of those who see mirages in their fellows be visited upon the innocent victims of their imagination? Let us be more rational in our dealings with our fellows. Let us not condemn them for things they should not be held accountable for, but let us rather seek for all that is good and hold that up for the survey of ourselves and others.

A question is often raised on the desert by cattle-men and others that is worthy of serious consideration. Do cattle *see* water, or do they *smell* it. If they only smell it, then a mirage can never lure them to death. Most cattle-men will tell you that

cattle never see water. I do not believe it. I have seen cattle struggling to reach mirages, and in the southwestern corner of the Colorado Desert, where more mirages appear than anywhere else, are the bones of thousands of cattle. In one of Mr. Eytel's forceful paintings a drove of cattle is being taken across the desert. In the distance behind them lies a mirage. The cattle have stopped and two of them are bellowing in their anger that they are not allowed to go and quench their thirst in the mirage water. Critics have censured the picture as untrue to life. I take issue with them on the grounds stated. I shall be glad to have the matter discussed by scientists and others.

The intense heat of the desert by day and cold by night are often matters of much wonder to those who have not given the subject much thought. In his experiences on the desert, Coville the botanist says: "Often on the desert in winter, after working during a sunny afternoon in a warm and comfortable tent, we found ourselves within a few minutes after sunset chilled and shivering. We observed a frequent daily fall of temperature from 70° Fahrenheit to a few degrees below the freezing point. In summer a similar daily range occurs, but with higher extremes."

Pack-burros on the desert

While a full presentation of the question is one that would demand far more knowledge than I possess, a few simple statements may help to a clearer understanding. All the heat of the earth comes from the sun. Tyndall has proven that heat is but a mode of motion. The vibration of the sun's rays cause a corresponding vibration of the ether which surrounds the known universe. This ether acts in, and through, and independently of, the aqueous vapor of our globe. The ether vibrations, when they strike the earth, set the surface molecules in action, which thus become

radiant heat waves and have their own initial power to radiate. But the sun's rays are different in quality from the earth's rays, and substances that absorb the one do not necessarily absorb the other. Through a layer of water, for example, one-tenth of an inch in thickness, the sun's rays are transmitted with comparative freedom; but through a layer half this thickness no single earth heat-ray could pass. This singular fact accounts for the heated envelope of the earth that preserves life at night. Were there no aqueous envelope the heat of the sun during the day would be converted into earth heat and would be radiated back into the ether with great rapidity. But when night-time came and there were no heat waves from the sun the little heat remaining in the surface molecules of the earth would be so speedily radiated that severe frost would ensue and life be destroyed, ere the morrow's sun could shine. This is now prevented by the absorption of the earth's heat-rays by the aqueous vapor surrounding the earth. This becomes heated by the absorption of the earth's heat waves, and retaining the motion during the night, wraps our earth around in its warm envelope to our protection from the deadly chill that would otherwise ensue.

Here, then, we have the secret of the intense heat of the desert in the daytime and its corresponding coolness during the night (except of course in those special cases where other factors come in and complicate the problem). During the day the sun's heat waves strike the floor of the desert with slight interference or interruption from either aqueous vapor or impurities in the air. This gives great direct heat. But as there is little or no aqueous vapor in the atmosphere above the desert floor there is nothing to absorb and retain the responsive earth heat waves, and when the sun goes down these earth waves speedily give out their force and a rapid lowering of the temperature is the result.

Wherever drought reigns, whether in the Sahara of Africa, on the heights of the Himalaya, in the heart of Australia, or on the Colorado Desert, the effect is the same and refrigeration at night is most painful.

CHAPTER X

The Colors of the Desert

I DO not propose to attempt a learned dissertation upon the causes of the marvelous color effects seen upon the desert. I find in my note-books various descriptions written with especial reference to color and I deem these of sufficient interest to present in this form.

In all ordinary conditions the colors of the desert are well defined and distinct. Especially are the shadows strong and vivid. The blacks remind one of the shadows cast by the mountain ranges on the moon, when observed through a powerful telescope.

During the sand-storms the mountains that shut in the northwestern end of the desert undergo marvelous transformations. The atmosphere becomes charged with fine sand and dust particles upon which the sun reflects and plays as the clouds that intervene between it and the dust allow. Late in the afternoon this dust becomes luminous with a half-transparent color-light that glows and shines and makes the whole mountainside appear as a veritable mountain of transfiguration; as if the "glory of the Lord" shone upon it. One feels in looking at it that he is on holy ground and must not only take his shoes from his feet but uncover his head in awesome reverence.

Then, if his attention be called away, and he look again fifteen minutes later, the divine glow has gone, and a sullen, bluish, sodden effect takes its place. The sand-veil is there, but no longer illumined by the sun. A little later, and it becomes a misty purple, and night finally curtains it with its darker shades.

The sun is just rising over the Chocolate range. For an hour the eastern sky has been a changing glory of orange, fiery red, and madder brown. Now as the sun bursts over the hills and

floods the desert the range to the left is outlined with such distinctness as to suggest a black silhouette on a white background; but the color is royal Tyrian purple instead of black, and the background a luminous pearly opalescence that shades off into the pure blue seen only over desert and southern ocean skies.

At this early hour the light shining at so low an angle reveals the different ridges of the San Bernardino range with a vividness that is startling to one who has seen them before only in the direct light of noon. Now each ridge stands forth as clear and distinct in its own individuality as can be. The "pip, pip, pip" of the quail is heard on every hand; the wild deluge of

Group of palms on the desert

song of the mocking-bird; the cheery warble of the linnet; and from the distance the faint crow of the domestic rooster calling his family out to gather the early worm.

The peculiar lighting of these early sunrise hours well repays much and careful watching. The beams of light strike through certain passes in the mountains, flooding slopes and peaks and ridges beyond with patches of vivid light and color, while other places are kept in shadow by the arresting of the sun's beams by giant mural faces or higher peaks close at hand.

How the delicate tints of the desert appeal to you seen in contrast with the strong colors! Here are the browns, grays, reds,

Copyright, 1904, C. C. Pierce & Co., Los Angeles, Cal.

PALMS IN THE CANYON NEAR INDIO, COLORADO DESERT

and greens of the mountains, with the greens and purples which shade into blackness, and stand out vividly against the pure white of the snowy peaks beyond. Then there are the deep black gashes of the canyons, with here and there a patch of delicate pea-green showing that trees are growing near running water in the mouths of the canyons.

At dawn, and equally at sundown, everything seems bathed in a soft greenish gold atmosphere giving to animals, moving figures of men, silent wagons, gently waving trees a peculiarly mysterious appearance that one can hardly describe and that is never felt or seen away from the desert.

On the morning of March 30, when I awoke, the whole sky was filled with clouds. The stars were scarcely to be seen; only one here and there. The air was motionless above, though there was a slight surface breeze blowing from the east. Everything was somber and gray until dawn. Then began the color changes. When the sun emerged it was cautiously, as if afraid of disturbing the quiet peace of this tranquil scene. There was none of that vigor and force and decision that one feels in Browning's sunrise:

> "Faster and more fast,
> O'er night's brim, day boils at last:
> Boils, pure gold, o'er the cloud-cup's brim
> Where spurting and suppressed it lay,
> For not a froth-flake touched the rim
> Of yonder gap in the solid gray
> Of the Eastern cloud, an hour away;
> But forth one wavelet, then another, curled,
> Till the whole sunrise not to be suppress'd,
> Rose, reddened, and its seething breast
> Flickered in bounds, grew gold, then overflowed the world."

Here the quiet gentleness was most apparent. The color changes also came quietly. Slowly the San Jacinto range deepened into a sullen purple, entirely different and distinct from that luminous purple that is the joy of color lovers in Southern California mountains. Only for a few minutes was there any tinge of color in the sky, and that was a peculiarly rich salmon red; but, all at once, right in the center of the field of vision a single

cluster—if I may so speak—of the peaks of the Sierra San Jacinto blossomed into a luminous madder lake,—not of solid, pure color, but variegated enough to give it rich beauty,—all sunlit and gorgeous. The startling vividness of it was enhanced by the somber purple of the rest of the range. It seemed as if it and the immediate sky had been deluged with a strong blue solution, such as the laundresses use, only of quadruple strength. Even the snow-caps on San Jacinto and San Gorgonio were blue, and this dolorous color served marvelously to accentuate the gorgeous brilliancy of the colored peaks.

A large palm group in Palm Canyon

This morning with the sky all somber and colorless the Salton Sea is a pale yellowish green. I have never seen it of this color before, though this is not an unusual color for the desert. A similar tone is seen extending along the foot-hills from the northern edge of the alkali flats of the sea until the feet of the Chocolate and San Bernardino Mountains are reached.

I have also seen the Salton Sea when it possessed a deep violet

color. This was in the late afternoon when the direct rays of sunlight were no longer upon the water.

The desert sky is sometimes so luminously splendid, so glowingly glorious, so fit for the pathway of cherubim and seraphim, of angels and archangels, nay, of the very God, that one feels he is looking on the streets of heaven, and he waits expectantly, entranced, breathless, as if at any moment stately and loving presences might pass which only the pure in heart could gaze upon and live. And then comes the passionate prayer: "Oh that I might see them and live! Oh that I might see them even though I die, if thereby all evil be taken from my heart!"

A Coahuilla basket of beautiful natural colors

As I look at these colorings and remember the attempts I have seen on canvas to reproduce them and then the comments I have heard on these canvases I am stricken with amazement at the self-conceit and folly of men who constitute themselves critics of the work of other men. Not for the attempt of the artist to reproduce have I any rebuke. He is but doing his duty. He sees and therefore should try to make others see. Yet however much he fails, the critic who knows nothing of the desert and its colorings, save what he has seen as his Pullman, with blinds drawn, has dashed over the desert, will complacently and with an *ex cathedra* air exclaim: "But the coloring! It is impossible! No one ever saw such colors as that in Nature!"

That is what I object to. No one — not even Titian, Velasquez, Rembrandt, Corot — is competent to make such a statement unless he has first reverently, and as a learner, gone to the desert and, with alert eyes, watched and watched and watched. Late at night, early in the morning, through the night even, and

at all hours between dawn and sunset, he must keep his vision ready and his soul receptive. Then, and only then, is he competent to tell what the Divine Colorist puts upon the skies and the earth for his pupils to copy. For the desert is God's color show-room; His divine exhibition salon to which He freely invites all men, — artists, colorists, decorators, mere lovers of color, — men and women with alert eyes and awakened souls to see beauty in all its nakedness: beauty so sublime, so awful, so stupendous, so awe-inspiring, as to be capable of full comprehension only by those souls that love the real more than the false, the simple more than the complex, the nakedness of Nature more than the prudery of Man.

On the trail to San Gorgonio Mountain

CHAPTER XI

Some Wild Animals of the Desert

I AM neither zoölogist, ornithologist, nor hunter. Nor do I propose to make this chapter a catalogue. I merely wish to record a few personal observations.

Life on the desert is as hard for animals as man; the struggle for existence as great. When one first comes in conflict with the fierce heat, the sand-storms, the long stretches of alkali or salt-sown soil, the piles of moving sand-dunes, the scarcity of water, he is assured that no animal life of any kind, by any chance, can sustain itself in such an untoward place. But, as I have fully shown, these are not all of the desert. There are fertile spots, delicious oases, mountain slopes and canyons, on and in which plenty of verdure grows, where pure mountain water flows, in abundant volume, so that, when the conditions are all considered, animal life on the desert does not seem quite as strange and impossible as before.

Mountain lion

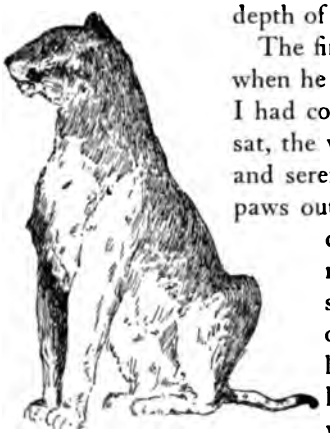
The largest wild animal seen on the desert is the mountain lion, more commonly known as the panther (*Felis concolor*). This member of the carnivorous tribe is large enough to thoroughly frighten an unarmed man, — as I always am, — unless, conscious of his own kindly intentions, he is willing to take those of the

animal for granted. This is not always a safe thing to do, as the mountain lion will attack a man if he is driven by either hunger or fear. A friend and I were once climbing a steep mountain trail in the heart of a dense forest. I was in the rear, carrying on my shoulder a very heavy tripod, reinforced with brass, and with long spikes at the ends of the legs. Stopping for breath, I happened to look up, and there on the branch of a tree, not ten feet away, was a large mountain lion just about to leap upon my unconscious friend. It was the work of a moment to

"Just about to leap upon my unconscious friend"

swing up my tripod in lance-like fashion over my friend's shoulder in the uncontrollable impulse to do something, what I did not know. Was it good fortune, or chance, or Providence that pointed the spikes of one of the tripod's legs at such an angle as to penetrate the eye and brain of the leaping animal, swerve it from its course, render ineffective its wild, death-dealing stroke, and so blind it that a few blows from the brassy end of the tripod killed it? The remarkable thing of it all was that my friend was not only unharmed, but almost unaware of what had happened until it was all over. He was an old man of somewhat slow mind, and when he heard my exclamation as I threw up the tripod he turned around to see me thrown topsyturvy down the bank. The cause of it he did not see. Before he was aware of it, his amazement was made complete by my sudden and energetic rising, picking up the tripod and fiercely swinging it upon the head of some prostrate creature which, until I struck it, had not made the slightest sound. Then it began to shriek and scream with a fierceness

that was appalling. Being blinded in the one eye, and possibly sympathetically affected so as to be unable to see with the other, his frantic strokes, which assuredly would have killed had they fallen upon either of us, went wild, and the long and strong tripod with its brass top, which had so often been scoffed at by my camera friends as cumbersome and ugly, out-of-date and preposterously heavy, became a most formidable weapon in the hands of a strong man. In far less time than it has taken me to write this story, the animal was dead at our feet. The force with which he sprang can be understood by the fact that the wooden part of the tripod beyond the spike had crushed the bones surrounding the eye, and had penetrated to a depth of fully an inch and a half.

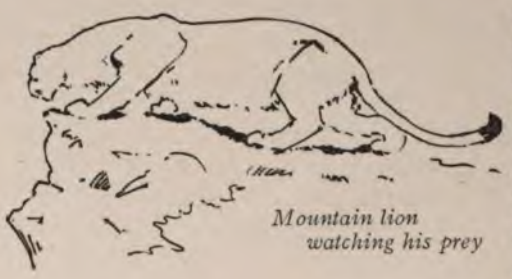


Mountain lion

The first time I saw a mountain lion was when he was unconscious of my presence. I had come upon him accidentally, and he sat, the very embodiment of dignity, as calm and serene as a huge tomcat, his head erect, paws outstretched, as if enjoying the wonderful outlook that had so enchanted me. He was sleek and fat, and his skin of good color. Save for a patch of almost dead black on the upper lip and reaching out to both ears, his body was a tawny brownish yellow, with a streak down the spine of slightly darker color. The belly was of a much lighter yellow, almost a dirty white. The tail was long and bushy at the end, which was darker in color, almost black. He was on the edge of one of the San Jacinto "forest islands," where deer are not scarce, and from his sleek and self-satisfied appearance I assumed he had just slain and eaten his share of a deer. Whether he saw me or not I do not know, for I edged away and never saw him again.

In hunting deer they are very wary and stealthy. They have all the feline's noiselessness and ability to steal on their prey. What terrible shoulders they have, how muscular, and how powerful! How swifter than any human motion is the blow of

those paws, in each of which are steel-sharp claws that tear to the heart of their victims, through skin, muscles, and flesh! Long-bodied, as wiry as a snake, more serpentine than the tiger, the mountain lion is preëminently fitted to be a hunter of deer, mountain sheep, or rabbits. It is very seldom he is seen down on the "floor" of the desert. The mountain is his range, for there he finds his prey. With a craft that seems almost like conscious thought he steals down to the edge of a precipice and looks over into the forest valley beneath where the innocent deer are browsing. Then, with stealthy but swift tread he finds his way down and around to where he can best sneak upon the helpless and simple creature. With one terrific spring, generally without any vocal noise, he lands upon the back of his victim, gives one or two stunning blows and tearings with those awful paws, then the crunch of his teeth into the spine tells that the killing is done.



Mountain lion watching his prey

On the Pacific Coast the mountain lion attains as large a size as three hundred pounds and has a maximum length of eleven feet from head to tip of the tail. I am assured that it can leap fifty feet at a jump.

Mountain lion asleep

It must not be thought that the mountain lion, the wildcat, or the wolf are common in the desert. They are seldom seen, and each year they become rarer. One might wander for years on the desert and never see one of any of them, and I know of many desert dwellers who are totally unaware of their existence.

The wildcat (*Lynx rufus*) is not so long in body as the moun-

tain lion, but stockier and with leonine shoulders. While I have seen trails on the desert, the animal itself has never appeared in sight except in the mountains or in the tree-lined portions of the banks of the Colorado River. There is some difference between the common American wildcat and the Texas species (var. *maculatus*), and it is possible that both species are found in the range of the Colorado Desert. I have seen two specimens also which do not exactly conform to the descriptions of either. The base color was a lightish red, which shaded off into light gray and black. Large spots of the reddish color were interspersed on the back and sides and on the limbs. The belly was pure white. The hair was long and thick and small tufts grew on the tips of the ears. One of these I had in captivity for a long time. While I always watched him carefully, he grew tame and ate from my hand, though always with a suspicious air as if he thought I intended to do him an injury.

Desert wildcat

One was caught early in 1906 in Mecca, where he had doubtless come to raid hen-roosts. He is said to be an adept at pulling shingles from the roof of a hen-roost, and helping himself to the choicest specimens.

By far the most interesting of all desert animals is the mountain sheep, of which a rare variety is found in the San Jacinto range on the desert side, way down into the peninsula. It is known to scientists as the *Ovis Nelsoni*. The sheep seen throughout California generally is the *Ovis Montana*. The differences between the two are readily apparent in that the southern ani-

mals are smaller and have shorter hair, it being stiff and harsh and well calculated to give its wearer protection against the severest weather. Its color is softened peachblow, when seen in January and February, but later in the summer, while it still preserves this color, it is less striking and vivid. Seen in contrast to the rich and deep greens of the trees, and with the gray granite all around, two or three of them give a note of color to the landscape that is peculiarly beautiful.

The specimens that I have seen have been far from wild, as I had been led to expect. While curious and much interested in my movements they did not scare and run as many of the bands I have seen in the Grand Canyon and its tributaries have always done. Of late years the Indians tell me they have hunted them but little and this may be the secret of their tameness.

They can be found in the high regions around Mount San Jacinto and on the Torres and Santa Rosa Mountains, Palomar, the Cuyamacas, and the Cocopah Mountains.

The first description (and best, for a short and popular account) I have ever seen of the mountain sheep is that given by Fray Alonso de Benavides, the Franciscan, in 1630. He says:

"There is a genus of mountain sheep, very great and with very bulky horns. And up a wall, though it be high and smooth, they clamber at speed; or up a high cliff as it were by a ladder. And frisking or in flight they are wont to fling themselves from the highest cliffs downward, falling always head first, and they rise immediately with all nimbleness, as if they had done nothing." [1] But for a full, popular, and intimate account full of life and poetry, there is no description in English literature as full and vivid as that of John Muir in "Mountains of California."

Mountain sheep were numerous in the early days of the gold excitement. The Indians often shot them with their arrows and traded the meat to the argonauts. Dr. Veatch, in 1857, tells of passing the trail of a flock of them, and seeing the head of one, probably killed by an Indian hunter.

Deer and antelope are both fairly plentiful on the mountain-sides near to the desert, though there are fewer antelope than

[1] Land of Sunshine, Vol XIII, page 436.

deer. How well I remember my first sight of a band of antelope! They were — where I have never seen one since — miles away from the mountains and in the very heart of the desert. Their curiosity was the thing that attracted me most. Gentle, beautiful, large-eyed creatures, they look and look and look as if fascinated, and provided you can keep them curious and free from fear they will remain watching for a long time. Any one who has ever seen an antelope must have noticed his large eyes. They are larger than a deer's and far more protuberant. They are constantly needed for their owner's safety as, though his sense of smell and hearing are as acute as those of the deer, he seems to trust his eyes the most. When curious or alarmed they seem to bulge out and such is the scope of their vision that they can see what goes on behind as well as in front. I kept this band watching me for several minutes by lying quite still but keeping up a constant fluttering of my pocket-handkerchief. At last some sudden movement alarmed them and they were off like a flash. With an easy, graceful, swinging gait they bounded along, fairly annihilating space, and in an incredibly short time were out of sight.

American deer

The deer is a far more interesting animal to me than the antelope. He is so gentle, so timid, so beautiful, and yet so valiant a fighter when he has to be, and though shy, I have several times found him fearless and friendly. On one occasion I was alone in the mountains and had just stopped for lunch. I had thrown saddle and bridle on the ground, hobbled my horse, and with a long, dangling neck-rope, had turned him loose to graze. For shelter I had stopped in a little clump of cottonwoods. As I rested there, half reclining, a buck, doe, and a fawn came along into the copse, browsing. When they saw me they looked curious and interested, but there was not the slightest suggestion of alarm. I made no movement, so they went on

browsing and for nearly half an hour I had an opportunity to watch them at close quarters. When, finally, I arose and went for my horse, they disappeared in the brush some distance away, across a small grassy open space. But let them be alarmed and how they fly along! They and the antelope are larger editions of the jack-rabbit. With leaps and bounds they dash uphill and down, over brush, through dense chaparral, and over sharp and cutting rocks where neither horse nor man can follow them, and are soon lost to sight. In captivity they are most friendly and will follow one around gently and shyly, begging for sugar or nuts. I have had wild desert deer and antelope both so tame in a few weeks that they would "nose" into my pockets for sweets or nuts that they knew I generally carried for them. They are also fond of raisins.

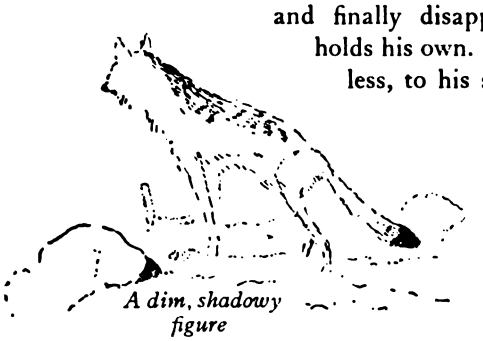
Don Coyote

Coyotes are quite common on the Colorado Desert. Madge Morris in her poem tells of the continued howling of the predatory creature, and many California readers will remember the fierce controversy that raged in a San Francisco paper, caused by Ambrose Bierce's sarcastic and scathing criticism of this line in Mrs. Wagner's poem, he contending that a coyote barked and did not howl. The fact is that coyotes both howl and bark, and one of their chief characteristics is the power to prolong and apparently multiply their musical performance so that the uninformed listener is convinced that he is surrounded by a fierce herd of frightfully vicious creatures all seeking his life and eager to drink his blood. When several animals unite their howls, barks, yelps, and almost unearthly screams or other noises, the effect surpasses belief. "It must be heard to be fully appreciated." About the only good thing in connection with the coyote's howling is that it is silent throughout the day, his desire for musical expression becoming uncontrollable only at night.

The coyote is a small prairie wolf. The name is Spanish, and is pronounced *ki-ó-ty* (the *y* short as in happy). Several varieties of coyote have been noted on the desert. In size they

may be said to be intermediary between the fox and the larger wolf, though they vary largely in the different species. Don Coyote possesses a sharp-pointed, fox-like muzzle, upright ears, and a long, bushy tail, which he carries with a grace and dignity peculiarly his own, except when being pursued, when it is hidden between his legs. In winter the hair is thick, of a dirty reddish gray, with a few black hairs generally scattered on the shoulders and the back. The skins, when properly dressed, make fine rugs and buggy robes, one that I used to have, made of twelve skins, having given me good service for many years.

Unlike most wild animals, the coyote does not seem to be much disturbed by the advance of civilization. Other animals decrease and finally disappear, but the coyote holds his own. This is owing, doubtless, to his sneaking and thieving habits. Domestic animals and fowls afford him a never-ending source of food supply, and his natural craft, cunning, and wariness make him a hard creature to poison or trap. Every settler in the desert has had some experience with the coyote, and many are the stories I might tell of his skill in evading capture.

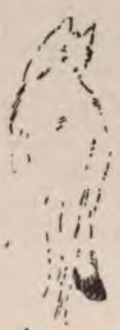


A dim, shadowy figure

Don Coyote is no epicure in the matter of diet. Given the opportunity, however, he would feast on delicacies like a lord. Indeed, when an undefended chicken corral is unexpectedly revealed to him he kills only to eat the daintiest parts of the bird. But his fastidiousness leaves him — as it does many another epicure with less legs — when hunger becomes his companion. He will then prowl into the orchard and take a bite of watermelon, preferably ripe, of course, but watermelon anyhow if there be nothing better. He will pick up the apricots that drop from the tree and, indeed, almost any kind of ripe fruit, and is especially fond of grapes and raisins. The mesquite bean, too, is one of his constant foods, and the Pimas tell a story in which the coyote

is made answerable for the wide distribution of their god-given mesquite, through the evacuation of the undigested beans. A similar story is told by the Indians around Palm Valley as to the distribution of the native palm (*neo Washingtonia filifera*) by the same process. The coyote is very fond of the tiny date of this palm. He also eats the juniper berry, manzanita berry, and the fruit of the prickly pear.

His fondness for sheep, colts, calves, pigs, goats, and chickens, and wild game, such as deer, antelope, ducks, and geese, is partially offset by his habits as a scavenger. Were it not for this he would be an unbearable pest. But he kills large numbers of gophers, rats, ground squirrels, chipmunks, prairie-dogs, and rabbits. The latter are a great pest at times, even on the desert. When there is a scarcity of food they gnaw the bark from fruit and shade trees, vines, etc., so as often to destroy them, and the coyote's service in keeping down the number of these tree-destroying pests is invaluable.



A mere outline

The largest coyote I ever saw was shortly before we entered the Salton Sea, when coming down the Alamo River. He was on the bank above us, in full sight, and appeared to be as large as a timber-wolf. With leisurely steps and slow he moved along, stopping now and again to get a good look at us, as we glided forward in our boats.

Two of the commonest animals of the desert are the jackass-rabbit, so called from his long ears, and the cottontail, so named from his bunch of white, fluffy, cottony tail.

Did you ever notice the difference in the running of a cottontail and a jack-rabbit? It is then that you realize how different the two animals are. The cottontail is much smaller than the jack-rabbit, — shorter in the leg and body. He is not made for swift running. He hides in the brush and is seldom found away from spots where there is plenty of undergrowth. But the jack-rabbit is built for speed. He is a racer. His "lines" all show either design for that purpose, or wonderful development in that direction.

Take a walk with your swift hound some afternoon where jack-

rabbits most do congregate. Don't urge your dog to hunt, but just look carefully at that jack-rabbit, as your dog starts him from his cover. Legs? No! he has no legs. They are zigzags of lightning covered with fur. He is the most perfect running machine ever constructed. His hind legs touch the ground simultaneously, and the moment they strike, the lightning is released and springing muscles and nerves shoot the body forth, as if from a catapult. It is an incredible bound, and the process is repeated with a regularity that is as astonishing as it is easy. See the dog who chases him! He is *working!* He consciously puts forth all his strength and exhausts every effort to reach the easily moving creature ahead of him. His neck is stretched out, his legs make frantic endeavors, his sides heave painfully at the desperate work of his lungs, but all in vain. He is plainly outdistanced and his howls of anger and vexation soon show that he is aware of the fact.

The kangaroo-rat (*Dipodomys merriami simiolus*) and trade-rat are both found on the desert. One day as I sat writing in the old dining-house at the Granite Mine I heard a little noise above me, and there, walking on the roof-plate, was a fine specimen of a kangaroo-rat. He was evidently on his way to what food supplies he could pick up around the table. His large eyes and scoop-shaped ears, his soft color and rapid, easy movements were most pleasing, and if one could ignore the pilfering and, worse still, the gnawing and destroying habits of the creatures, there would be much to enjoy in looking at them.

The trade-rat, or more properly the bush-rat (*Neotoma Mexicana*), is one of the interesting animals found on the desert edges. He builds his nest at the foot of a tree or under and between rocks. It consists of a series of arched galleries of sticks and twigs, filled up with moss and dung, terminating in a bed of moss, hair, and leaves. When at the base of a tree the nest is piled up instead of lengthened out, and I have seen them four and five feet high. The common name, given to this rat, is caused by his trading instincts. Like all rodents he is a great thief, and will gnaw his way into the miner's shack or settler's shanty at the first possible moment. Any articles that are left around are likely to strike his fancy, and these he bears away. But such is his

scrupulous regard for the appearance of honesty that, for the box of pills, the shaving-brush, the comb, the knife, the napkin-ring he takes away he brings and leaves a stick in its place. Hence his name. I have had miners and others tell me that they always knew exactly how many things had been stolen by the number of sticks piled up, these clearly determining who was the thief. But this I regard as rather apocryphal. This cunning little creature will find his way into your pockets — even that of a woman's dress — and steal therefrom whatever takes his fancy. I was sound asleep one night, when all at once something struck me on my body. In the dim light I saw that a large trade-rat had jumped upon me. Lying perfectly still I watched him. My trousers were hung up on the door near by — the quarters were small — and as I watched he made a spring, reached the trousers and ran up them to the top. There he hunted around, found the pockets and proceeded to rifle them. My knife, keys, and a piece of stick I used as a wedge on my camera were abstracted. The money was too slippery, I guess, so, going to another pocket which was full of string, he proceeded to pull this out, dropping everything stealthily upon the floor beneath. Just as he started off with his plunder I scared him. Now what I should like to know is: Would he have traded with me for everything he took, and if so, would he have put his exchanges on the floor, or have put them in my pockets? If the latter, would he have put everything in one pocket or in those he stole from? I wish some one would test Neotome Mexicana in these interesting particulars.

I must not forget to state that trade-rats are very fond of the succulent leaves and young shoots of the various species of cactus, so that they thrive well on the desert, provided they are in a cactus zone.

CHAPTER XII

Some Desert Birds

ONE great compensation for many unpleasant and disagreeable things about the desert is that there is a large variety of birds to be seen. This is neither surprising nor remarkable when the diversified character of the desert is understood. Palm Springs has such a unique climatic character that expert ornithologists have spent much time there. It is the boundary line between the warm, desert climate of the south and the colder climate of the farther north, and on this account one of the best locations for the study of migrating birds in the country.

In midwinter of 1903–4 Professor Joseph Grinnell of Pasadena, California, spent nine days studying the birds of this locality, and in *The Condor* for March, 1904, he gives a most interesting account of what he and his companions (chiefly Mr. Joseph Mailliard) found.

Hummingbird and nest

The desert and valley quail were both found in abundance, though, owing to the persecution of both Indians and whites, they were very wild. Mr. Mailliard thus comments upon the differences between the desert quail (*Lophortyx gambeli*) and the valley quail (*Lophortyx vallicolus*):

"The notes of the desert quail differ from those of the valley quail in variety, and to a certain extent in character, though they have some notes in common. The 'crow' of the latter consists of three notes, varying in length and accent according to the call given, in one case the last note being a falling one.

The 'crow' of the desert quail, while rather similar to the other, has two additional notes at the end, rendered in a softer tone. Besides the alarm-calls the valley quail has a few twittering or conversational notes, while the other species has a lot of these, quite varied and often given in a way that seems remarkably loud to one accustomed only to the notes of the former. Another peculiarity of the desert quail is the queer sound that it makes as it rises from the ground on being surprised into flight — the sort of screeching cackle, on a small scale, that a hen makes when frightened from her nest."

In some parts of the desert both species are found in large numbers, and they are unafraid, as neither whites nor Indians have attempted to shoot them.

Eagle

In the winter time, in the most unexpected places, wherever a few trees clustered, I have been delighted with the unconsciously noble singing of the mocking-birds (*Mimus p. leucopterus*).

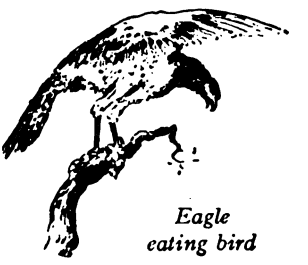
One night we made a dry camp,— that is, stopped where there was no water for beast nor for man, save the little in the canteen. As soon as the sun set we halted the burros, took off their packs and turned them loose to graze. They wished to hover about "camp" for the water we could not give and finally we were compelled to drive them away. With reluctance and remonstrance clearly expressed in their reproachful eyes and dejected mien they wandered off and soon consoled themselves with what forage they could pick up, especially enjoying the gallenas grass which grows profusely for a mile or so.

After a frugal evening meal it was not long before we unrolled our blankets and went off to sleep. During the night I was awakened by the sweet and prodigal melody of a mocking-bird, perched on a tree a quarter of a mile away. For a few moments I thought myself at home in Pasadena, listening to the glorious warbler who often cheers my midnight or later hours from among the orange trees, and then, suddenly as I rolled over in my blankets, my leg struck the sharp thorn of a cactus which the

night wind had blown into the right spot and in a moment the dear illusion was gone in the piercing pain of the present.

In the morning we found a line of trees, mesquites, cottonwoods, and desert willows, showing where the moisture of the winter rains was longest retained. On most of these trees the mistletoe had fastened itself, and in spite of our knowledge of its parasitical character we could not deny that the white berries give an additional touch of beauty to the green of the trees.

The birds, attracted perhaps by their beauty as well as their flavor, feed readily upon them. It is to these berries, too, that we must look for the solution of the water problem for the birds. Birds are often found in large numbers where there is no apparent water supply. Yet it is well known that birds must have water as well as men. How, then, are they provided? It is suggested that they fly to water and then return to these isolated and waterless places.



Eagle eating bird

An objection to this suggestion is found in the fact that they breed and rear their young in these places, and while this flying to and fro might be possible to them it would not be to their young during the first weeks of their existence. How, then, is the problem solved? It is solved by the mistletoe. The berries are a large part water and they thus become the water supply of scores of desert birds.

It is to the birds also that this parasite owes its large distribution. The seeds are evidently indigestible, for when they are voided after the processes of digestion they are still intact in the defecation. These seed-charged droppings lodge on the branches and in the crotches of the trees and in due time spring forth, striking their roots into the tree fibers and thus becoming part and parcel of the tree.

The elf-owl (*Micropallas whitneyi*), the smallest owl in the world, is a desert denizen. It is seldom more than five and a half inches high. It feeds on insects and small snakes. Alighting on the back of its prey it darts its sharp claws into it, speedily killing it.

The *Courier del Camino*, or road-runner (*Geococcyx californianus*), is often seen on the desert. It receives its Spanish name from the fact that it is generally seen on the road and when followed runs ahead with great fleetness, until, either tired of the game or afraid of being caught, it darts into the nearest bush for hiding. A Methodist minister of my acquaintance used to keep a fast horse and sulky, and drove over the same road every day for months, where several road-runners congregated. One of the birds seemed to wait regularly for his morning run. He came out of the bush at a certain place where there was a long stretch of road, and with a flirt of his expressive tail and an uplifting of his crest, would start off at full speed down the middle of the road. My friend then "let his mare go," and for half a mile or so the race was on. The road-runner could always keep ahead, but as soon as he was through he darted into the brush, to be ready, however, for the same race the next day.

The elf-owl

Road-runner

Owing to its pheasant-like appearance it is often called the "chaparral cock." Of all the desert birds this is the one that most appeals to me. While it is not rare, it is better seen in the out-of-the-way places, and though apparently exceedingly shy it soon becomes very tame and friendly when it finds that its confidence is not misplaced. On one of the ranches near Mecca a pair have their nest. Each morning one of them flies to an old stump and there coos somewhat like a dove. They come to the door for scraps and will almost take them from the fingers. When the land was being leveled scorpions and various other insects were being constantly turned up. The road-runners would follow in the wake of the scraper, and not unseldom, if they caught sight of anything in the scraper, would fly right down

and get it. One day a snake was killed and my friend's man picked it up on a stick and stood looking at it when a road-runner came and, taking it from the stick, ran with it to his mate and made a meal on it.

I have watched a road-runner when he thought himself unseen in the chicken yard of an absent Mexican. With lordly step and haughty demeanor he marched around among the hens and chickens, as if he were a true Spanish don in the presence of his inferiors. When the cackle of a hen denoted an addition to the egg supply, he strode toward the nest and coolly and deliberately pecked a hole in the new-laid egg and in a few moments had entirely swallowed it.

The preacher to whom I have referred once invaded a cactus patch where road-runners had their nest, and took therefrom two young birds. He turned them loose in his house, feeding them with scraps from the table. They soon became so thoroughly at home that they would run up to the minister and beg for food, just as will a dog. So fearless were they that in walking about he had to put his toe under them to throw them out of his way. He found them the most easily domesticated of any wild bird he had ever caught, and always speaks highly of the way they kept his tomato vines free from caterpillars, and his "garden truck" from insects and other pests.

Road-runner

Mr. George W. Glover, Jr., the editor of the *South Pasadenan*, writes his editorials under the name "Roadrunner," and he publishes in Pasadena another weekly paper which he calls solely by his editorial name — *The Roadrunner*. Mr. Glover is also interested in mines on the desert and occasionally leaves the editorial chair for a *pasear* on the desert. He writes me about the road-runner as follows: "Wild, alert, always on the lookout for danger, suspicious to an inordinate degree, he is yet wise enough to know his friends. Go into camp where I will on the desert, if I remain but one night I see little of him. If I remain

a week, before I break up camp I find it necessary to kick him from under my feet. At first he will come around the camp at a distance of several hundred yards, evidently sizing up the situation and seeking to know who his new neighbors are. When he finds that they are not aggressive he approaches nearer. Throw him out a few crumbs and he will run away, but he invariably comes back for them. After this he ventures nearer, and if you talk to him as you would to a human being you soon win his confidence. Once I camped at a spot for a week and had this experience with a pair of these birds, so that the last two days they were fairly familiar. They had been much interested in the small camp-fire, and whenever the cooking of meals began they were on hand. As I sat upon a rock holding the frying-pan in my hands they ran up to within a few feet, much interested in what was going on. When I left that camp those birds followed me for fully three miles, sometimes ahead of, and sometimes behind my wagon, but keeping me in their company."

Road-runner sunning himself

One of the most tenderly cherished illusions of California is that the road-runner is the deadly foe of the rattlesnake, and will fence the reptile in with a hedge of prickly cactus, and begin to tease it. When the angry reptile strikes, the road-runner so arranges the thorns that he leads the snake to dart at the prickles, and this so mortifies and humiliates it that it then strikes its fangs deep into its own flesh and dies.

One of California's most reliable authorities, T. S. Van Dyke, flouts this story as an altogether unreliable yarn.

While I have never seen it done, I have talked with desert men who assure me that they have, and until I know the road-runner better I cannot condemn the story as emphatically as does Mr. Van Dyke. One prospector with calm protestation of truth tells me that many times when he has been riding or walking along he has watched the road-runner swiftly moving at a distance. Suddenly he stops, looking sharply and steadily at a certain spot, while his tail bobs up and down, this side and that, corresponding

somewhat to the excited and agitated movements of his head, while his crest rises until it stands like the feather cap of an Indian war-chief. He has caught sight of his arch-enemy, the rattlesnake, sunning himself, and — sound asleep. With a rapidity as wonderful as it is stealthy, the road-runner dashes off and shortly returns with a bunch of the cholla cactus dangling from his bill. Gently he lays it down conveniently near to the sleeping snake. Then he goes and comes, each time returning with his bunch of chollas, which he lays alongside that which he has brought before, until at last a complete hedge is formed around the unconscious snake. When he awakens he finds himself a prisoner. In vain he tries to escape. The sharp needles of the cactus prick him too severely. Angry, wounded, and defeated he retreats in sullen anger, only to be irritated by the raised crest, fluffed-out feathers and sharp bill of the road-runner. He darts his vicious head forward only to strike the wounding cactus, and when at length he is wearied with the long conflict his feathered foe begins a vigorous attack. Striking here and there with his long, strong bill he soon kills the snake, and then, at his leisure, proceeds to eat him.

Blue heron

It is a good story whether true or not, and some day I intend to find out the truth or falsity, though, as I have stated elsewhere in relation to the horned toad, I have been unable in many years to make this interesting little creature do what a score of scientific observers assure me he often does. As yet I am not prepared to deny *in toto* the ability of the road-runner to do what so many affirm he does do.

As to its eating snakes, that I can fully confirm. I have seen it kill snakes, even the sidewinder, though Mr. Van Dyke suggests that this must be when the reptile is sluggish on a cold morning.

Three things arrest one's attention the first time he sees a road-runner. These are the size and flexibility of the tail, the curved end of the bill, and the erectile crest, and a fourth may be added

if one gets near enough to the bird to examine it closely, viz., its wonderful color. The feathers on the upper parts and wings are of a dull metallic olivaceous green, broadly edged with white near the end. There is a tinge of black in the green along this line of white, which itself is suffused with brown. The play of light on these feathers is exquisite, and the erectile movement of the crest is interesting in the extreme. Some of the crest feathers are a dark blackish blue. The tail movements are remarkable. I verily believe that if one were long familiar with the road-runner he might understand its thoughts purely by the motions of the tail. It reflects every mood of the bird. Like a Japanese conjurer with a fan, the road-runner can play upon your emotions and imagination with his tail until you come to think it gifted with almost super-ornithological power.

Flying herons

In size the bird is from twenty to twenty-three inches long, of which twelve or thirteen inches belong to the tail. Its eyes are very large and dark gray in color, with a dark blue iris.

The young generally leave the nest in early or mid-April, and it is no uncommon thing for the teamsters to the mines to run them down about that time. Even at so young an age they run with fair speed, but are easily tired, and then, seeking the shelter of a bush to hide, are easily caught. The eye of the road-runner is surrounded by a naked spot, which above it in front is a deep Prussian blue, under the eye it shades down to a lighter blue and nearly white, while behind the eye it is orange.

Thousands of a small bird that flies and skims the surface like a swallow are to be found in flocks at the south end of the Salton Sea. One morning I watched four different flocks of them. They flew to and fro, as close to the ground as possible, occasionally resting on the white salty soil. When they did so the birds at one end would fly, in sequential order, over the others and alight at the other end of the flock. As they kept this up for several

minutes I wondered whether it was a definite plan taught them by centuries of experience, for the picking up of the myriads of gnats that we found covering our bedding when we awoke. The vast quantities of these gnats can scarcely be believed, yet so large was their number where we cached our boat effects and supplies in the volcanic rocks at the southwest of the Salton, that as we walked along and they arose from the ground they made a noise that resembled the roaring of the sea, or the rushing along of a train, when heard at a distance.

Brown eagle

In the chapter on the trip down the Alamo River I have told of the vast numbers of pelicans, herons, gulls, ducks, geese, etc., that there abound. A number of hawks and eagles were also seen. There are many of the latter in the northern part of the desert, all doubtless having their eyries in the summits of the near-by mountains of San Bernardino and San Jacinto. The eagle is well enough known to require no description at my hands, but there is a sublimity in the flight of an eagle on the desert that is not felt in any other place. For, as the great bird arises, winging its fearless way directly into the eye of the sun, there is nothing to distract the attention from its heavenward flight. Here there is a sea of yellow nothingness below, and a sea of exquisite bluish-green space above in which this simple object of blackness floats and soars as though it sought entrance to the very palace of God.

The largest of all North American birds is sometimes found on the mountains of the western edge of the Colorado Desert. This is the giant condor (*Sarcorampus californianus*), and long supposed not to exist in California. As far as I can learn, it seems to be the link that binds the carrion-eating vulture to the live-flesh-eating eagle. As is well known, the eagle always prefers to kill its own food. The condor, on the other hand, though able to kill, prefers to find its meat fresh and sweet, but already

slain, while, on the other hand, the vulture is better satisfied with carrion than sweet meat.

In ascending, the condor has a spiral-like flight, though it sometimes gorges itself to such an extent that it cannot fly. Raising its wings it runs in a ludicrous manner, but cannot rise, and finally, with an air of resignation, it hops to the nearest rock or fence-post, and there remains until the effect of its feast has disappeared.

In appearance the condor is not unlike the vulture, though its feathers are of a uniform brown-black color. The head, down to the root of the beak, is covered with a beautiful lemon-colored loose skin, which sometimes deepens almost to orange. The beak is horny white, and curves over the lower bill, with a point as hard as iron. The under mandible is a perfect half-cylinder, into which fits with perfect accuracy a hollow tongue serrated with a hardened edging inclining down the gullet. The roof of the mouth has hard spinous points inclining in the opposite direction, and by forcing the meat it is eating against these spines it is torn and shredded in the process of deglutition.

When erect, the bird stands fully four feet in height, and is a most imposing creature, appearing at a distance perfectly black. In flight, however, it is more than imposing. It floats without the slightest effort, and is the most graceful of all objects that navigates the air. From the summit of the high mountains, where the air is light and thin and one can clearly see objects at a great distance, I have watched this wonderful bird with a pair of glasses for over four hours, without discerning the slightest motion of the wings, sailing to and fro at times with the merest "cant" of the body, and then remaining motionless. The wings are "flapped" when they begin to rise from the ground, but when fairly aloft, save in going along in direct flight, no such motion is necessary. As they rise a white band is revealed on the underside of both wings, but this does not extend across the body. An ordinary sized male will weigh twenty pounds, and its breast bone is eight inches across. It has two gizzards, the upper one small as a chicken's and the lower one four times as large. The inside of the large gizzard is lined as with coarse sandpaper.

There is a penalty attached to killing the condor, but as re-

cently as August, 1906, a band of four hunters, short of food, went out and killed a deer, which they bled and cut into quarters, putting it in the shade and covering it with their coats. A few hours later, when they returned, they found a giant condor on the meat, and he arose bearing a quarter of the venison in his talons. The four of them leveled their guns and shot simultaneously, and the condor fell with a broken wing. Though wounded, he put up a gallant fight, striking with his good wing and jumping directly toward his enemies. It was not until they had emptied their revolvers into him that he was killed. They report that he measured the enormous size of eleven feet seven inches from tip to tip of his wings, and this can readily be believed as they showed photographs of the wings alone that are over five feet long.

A few days following that on which the account of the killing of the condor appeared, the secretary of the California Audubon Society announced that, as the law of the state protects the bird, and makes it a misdemeanor to have possession of even a part of one, he should institute suit against the men who did the slaying of this rare bird. It is to be hoped the suit will be successful, as there seems to be no other way of putting a stop to the needless killing of birds and animals by those who, having a gun, feel they must shoot and kill some living thing, no matter how useful or harmless.

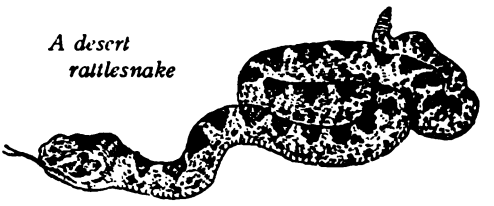
A quiet and cool retreat in Andreas Canyon

CHAPTER XIII

Reptiles and Insects of the Desert

REPTILIAN life on the desert is peculiarly abundant and interesting. The various forms of rattlesnake, the large family of lizards, the chuckwalla, the Gila monster, the desert tortoise, are all of singular interest to me.

To those who are able to put aside their fears and inherited prejudices there is wonderful fascination in the beauty, and the grace of movement of the rattlesnake. The delicate colors and the exquisite way in which nature tints the diamonds — the soft grays and olives and browns and salmon reds — cannot help but appeal to all true lovers of color harmony. And the grace of movement, the easy, noiseless, undulating elegance of motion are unsurpassed by anything save an eagle in its soaring.



A desert rattlesnake

The diamond-backed rattlesnake (*Crotalus ruber*, Cope) is common on the desert. Friends of mine have caught several near Mecca. Of two specimens before me as I now write, one is a rich reddish cinnamon, variegated in exquisite shades. Down the center of the back from head to within two inches of its rattle is a row of diamonds, irregular enough to give one the sense of real life as opposed to something made with the uniform and monotonous regularity of a machine. The diamond is composed of a dark blotch, edged around with markings that are nearly black, and separated from each other by other edges of light cinnamon. The diamonds are more distinct and clear

from the head of the reptile to about three-fourths of its length, where they begin to shade off and become less emphatic. The gastrosteges, or belly scales, are almost white.

The wife of one of Chicago's distinguished clergymen so fully appreciates the beauty of the diamond rattlesnake that she is able to cast aside all feminine antipathy to the reptile and use its beautiful skin as an adornment for insertion in a dress waist.

The other rattler has a skin of grayish brown, a little less attractive in color than the former one, but equally beautiful in form and general effect. Its length is four feet one inch. It has thirty-one diamonds from head to rattle.

The Moravian missionary at Martinez has had several experiences with rattlesnakes. They are nothing out of the common, and they serve to illustrate the possibilities in several years of desert experience. He was driving along one evening just at dusk, when his horse stopped and refused to go farther. The road was in the village and fenced in, therefore he could not make a detour, so, jumping out of the buggy, the minister ran ahead to see what was the matter. Suspecting the cause he went cautiously and there found a long big rattlesnake stretched across the road. To kill it was the work of a minute, and, after beheading it to make sure, he returned to his buggy and drove on.

On another occasion, one afternoon in the summer of 1905, he had left his buggy in the yard. After supper he went out to put it into the shed. I should here explain that my friend is quite deaf and would be unable to hear a rattlesnake unless he were very attentive and quite close. As he picked up the shafts and started off, his wife, who by mere accident came out after him, heard a rattlesnake. Though she called out he paid no attention, went on, put away the buggy and returned. Next morning, hearing his dog barking at some object on the lawn, he went out and found the snake, wounded, and barely able to move. He had either trodden upon it or the buggy had gone over it, and thus injured it. He killed it and measuring it found it four feet and three inches in length.

About two years ago he was going out to picket his horse behind the barn, when, suddenly, he came upon a rattler, coiled

up, watching at a gopher's hole. He was walking quickly and being unable to stop stepped right over the snake. As soon as the horse was attended to, he returned to the spot and found the snake still there, undisturbed by his passing over it. To get a hoe and kill it did not take long. The snake was so intent in watching for his supper, — waiting for the coming out of the gopher, — that the movement of the man had not frightened him or driven him away.

The first year of his ministry to the Indians his wife utilized a box placed on end with shelves inside it for a kitchen cupboard. One day she dropped a knife behind the box, and after failing to reach it, asked her husband to do so. He removed the box and there, as well as the knife, he found a rattlesnake coiled but apparently not angry, for it neither rattled nor made any hostile movement. Of course it was speedily killed.

Tiger rattlesnake

I have killed many diamond-backed rattlesnakes on the desert. In March, 1906, as my companion and I passed through the Hayfields, in Crawford Valley (a place where, some years, gallena grass grows in great quantity), a large rattlesnake called our attention to his presence on the right-hand side of the road. There was not a stone in sight, and the only stick at hand was the stock of our rude riding-whip. Making a weapon of the handle, I struck the snake on the head, stunned him, and then cut off his head. My companion, who had had no experience with snakes, was horrified at the muscular contractions of the headless creature and was really afraid for me when, with startling force, the headless reptile made what seemed to be a vicious and well-aimed strike at me. I skinned the body, and, though skinless, tailless, and headless, the body was still writhing and occasionally making the quick muscular dart forward of its strike when we left it.

The flesh was white and clean and easily gives color to the statement made by many people that they have eaten the flesh of a rattlesnake. They say it is tender and sweet and far preferable to chicken. That may be so, — there is no accounting for

taste. Personally I prefer chicken, especially if it is of the yellow-legged variety.

When measured this snake was found to be four feet six inches long. His color was a variegated brown of a beauty impossible to describe. I never see the beauty of a dangerous reptile such as a rattlesnake, a Gila monster, a cobra, but I am led to the reflection, "Why waste so much beauty on a creature so repulsive to the major portion of mankind?" Possibly man was not considered in the distribution of beauty among the objects of nature. He himself is one of the objects, instead of being an outsider, a superior creation.

This rattler had thirty-five diamonds on his back of a peculiar, irregular, dark brown, with the diamonds in a deeper color, lined or edged with scales tipped with creamy brown. In some cases this edging is very indistinct, indeed almost absent on the head end of the diamonds, but very clear on the tail end. At the tail there is a half-circle of ashy color with four alternate quarter-circles, then one more half-circle and the rattles, of which nine were still on when the skin was dressed.

A traveling rattlesnake

Some six or seven years ago a rattler of this same species was found in this same locality — the Hayfields — which measured over six feet in length, and over a foot in circumference at the thickest part of his body. The specimen I killed must have been a relative, for I have seldom seen a snake of this kind with so thick a body.

The horned rattlesnake, or sidewinder, as it is commonly called (*Crotalus cerastes*, Hallowell), is well known on the desert. I have found it north, south, east, and west. At Palm Springs I came upon a family of five at one time. They all came to an inglorious end under a huge rock. In the Eagle Mountain valley I killed one, and later my companion also killed one. A few days later I ran upon one in the dry wash coming down between the Chocolate and Chuckwalla ranges. The latter escaped into

a dense pile of washed-down brush, but I set fire to it and hope he was burned. For of all the rattlesnake family I find this is the most dreaded. I suppose it is because it is quicker in its movements and its side motion makes it more uncertain where and how it will strike.

It is much smaller than the ordinary rattler and is peculiar because of the horns which rise over each eye. These horns are the superocular scales which assume this shape. It is more marked, however, because of its strange side-winding motion. Instead of the straightforward progression of the ordinary snake it makes a strange twist to the right, and thus moves forward sideways, making a track upon the sand almost the shape of the letter S. At the head and tail of the letter a deeper depression is made, clearly showing that the snake rests first its head, then its tail in these depressions, giving its whole body a lift forward as it does so. Though it will fight if compelled, it is less aggressive than the ordinary rattler, and will always escape if it possibly can. It lives upon the rats, mice, chipmunks, and lizards of the region.

At the end of April I have often found them in pairs, and it is probable that this is the mating season, though I am not able to determine their sex. I do know, however, that they follow each other as most mating creatures do, and are so interested and preoccupied as to forget to retire to their usual holes or shelter during the night. The result is we have often found and killed them in the cold mornings when they were too chilled to be able to move.

All the sidewinders I have seen have had a peculiarly beautiful color, which reminds me somewhat of a bright new rug of soft colors and shades. The one I have before me now as I write has a body of pleasing gray, with a series of spots down the back of a very much toned-down salmon-red, and a corresponding series on each side, near to the belly, of almost black spots. Over the whole body are scattered minute grayish spots as if it had been sprinkled with an air-brush.

For years it has been a common delusion that a rattlesnake could not strike unless coiled. This is utter nonsense. A rattler can *bite* when at full length, when moving, or, as I once

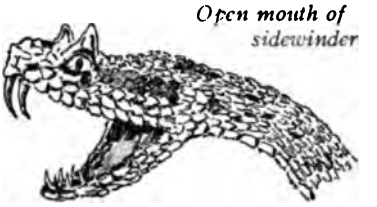
found to my pain and narrow escape from death, when held securely in one's hands. When coiled he has the power of springing to more than half his own length, and his speed and accuracy of aim make him much to be dreaded at such times, though his aim is not always certain. When uncoiled he can also spring half his length, and has the wicked art of swinging in a semicircle when one least expects him. Even with his back broken he can strike, and when apparently dead should be approached with caution. I have known dangerous wounds inflicted by a "dead" snake, when an attempt was made to cut off his rattles. The muscular contraction caused by the incision of the knife made the apparently dead reptile swing around and give a bad blow and bite, for, as a rule, it should be remembered that the snake's action is not a "bite," pure and simple, but is a combination of blow and bite so rapidly delivered that it is difficult, if not impossible, for the unaided eye to follow the various movements composing it. With a rattlesnake held in my hand, and watching every movement with keen and trained eyes, I found it impossible to recognize the processes. And yet the snake can bite, as we usually understand the word. I have seen it force its fangs through a half-inch of flesh with no other motion than the bringing together of its jaws. Such a bite is possibly more dangerous, too, than the ordinary strike, for in a deliberate bite the fangs penetrate and the poison is injected more deeply than in a sudden blow.

Sidewinder

Another popular delusion is that the forked tongue of the snake is its dangerous "sting." The tongue of a rattlesnake is as harmless as that of a dog. Why the snake darts it back and forth, and why it is forked, and why it looks so wicked and vicious at such times I do not know. The fixed, steady glare of the eyes has a hypnotizing effect upon most people, and adds to that sense of conscious wickedness most people believe inheres to the rattlesnake.

Still a worse and more dangerous delusion is that whisky is

the best "antidote" for snake poison. The following of this delusion has slain far more snake-bitten people than have been poisoned. Let it be clearly understood that whisky, save in doses of a teaspoonful every half-hour, is a most dangerous "remedy" for snake-bite. It kills many a person who would have recovered if nothing had been done. Leonard Stejneger, the government expert upon this subject, emphatically says: "It cannot be emphasized too much, or too often, that intoxication" (alcoholic), "so far from helping the cure, helps the poison, and that persons having been made intoxicated beyond excitement, when under treatment for snake-bite, and yet recovered, have so recovered not from the treatment but in spite of it. It should also be remembered that the alcohol has no beneficent direct action upon the venom; on the contrary, applied locally or intravenously, it seems to add to the virulence of the poison."



Open mouth of sidewinder

It will doubtless prove interesting to the generality of readers to know accurately the "how" of the rattlesnake's venomous bite. The fangs are hinged to the upper jaw, and are covered with a sheath, somewhat after the fashion of a cat's claw. Each fang is a large and curved tooth terminating in a sharp point. Near its root it is grooved, or slit, then the edges of the slit close and it becomes a canal, to open again into the groove near the pointed tip. When the snake wishes to strike, the fangs are unhinged downward, after the mouth is very widely opened. The two actions are not dependent upon each other, as the mouth is often opened and the fangs remain sheathed. For while at rest they are enclosed in a muscular sheath, which drops back into folds at the base when the tooth is in active service. The elevation of the fangs is a voluntary action on the part of the snake, and it is sometimes done with a deliberation that is as lazy and slow as the action of a sleepy cat.

In striking from the coil the rattler is not to be supposed completely coiled. The neck and upper part of the trunk are not thrown into circles, but lie in two or three curves or folds across

the mass of the coiled body, with the head raised three or four inches. Out of its mouth darts the forked tongue, an invariable sign of irritation and anger. The end of the tail is generally either elevated a little from the center of the coil or on one side, and is projected far enough away to allow of its vibrating with freedom and speed. The noise is one to be readily recognized by those who have never heard it, and never forgotten by those to whom it is familiar.

With a dart forward that is lightning-like in its rapidity, the snake strikes its object, and as the teeth or fangs enter the flesh several muscular movements take place almost simultaneously. The body of the snake acts as an anchor, while a neck contraction draws the head back so as to force the fangs in deeper. At the same time certain other muscles draw the points violently backward, and this sinks them deeper still. Immediately, or simultaneously, the lower jaw, with its pointed teeth, closes upon the object, and this results in the farther deepening of the wound and in the injection of the poison. If the object be large and flat, so that the lower jaw cannot get under the object, this last action is considerably minified, though the ejection of the poison takes place.

According to Dr. Weir Mitchell the muscles that help draw up the lower jaw are so folded about the poison gland that it is simultaneously squeezed and the poison is thus forced into the duct leading to the fang. This would make the ejaculation of the poison involuntary on the part of the snake, though elsewhere the learned doctor explains fully his discovery of a sphincter muscle which, by its contraction, closes the duct, so that, although there is muscular pressure upon the gland, the snake, at will, can close the sphincter and thus prevent the ejaculation of the poison. My own observations have confirmed this, as in my own case when bitten, though both fangs penetrated my thumb, the right poison gland only was evacuated, and I afterward forcibly compelled the ejaculation of the poison from the left gland.

The connection between the gland, the duct, and the fang will be clear from the accompanying diagram. But it should be remembered that the fang, when closed and sheathed, has no

connection with the duct. It is only when the fang is raised that the two come together, and should there be any misplacement of any kind, the poison escapes through the opening of the duct and fails to enter the fang. This fact explains what many have noted but failed to understand, viz., that sometimes there is a large amount of the venom spilled outside the wound made by the fang.

The growth of the fangs is a remarkable provision of nature. Behind the fang in service are a number of subsidiary or reserve fangs, the one nearest to the active fang being thrust forward when required to take its place. If it be lost or shed it is speedily replaced (within a few days), but if broken or violently displaced it requires several weeks. There are from eight to ten of these reserve fangs in all stages of growth, from tiny ones that appear as mere points.

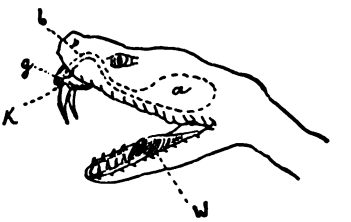


Diagram showing rattlesnake's fangs and poison glands

The poison glands are at the rear of the base of the fangs, behind the eyes, on the sides of the upper jaw. In shape the gland is a flattened, almond-shaped oval, the rear end being well rounded, and the front end tapering to the duct, which begins just behind and below the eyeball.

The mouth glands of reptiles are more specialized than the mouth glands of amphibia. This is clearly shown, not only by the fact that they are separated into distinct groups, but by the greater complexity of the individual elements of the glands. The poison gland of the rattlesnake is a modified form of a part of the upper labial gland. This gland has no well-defined homologue in the mouth of the mammal, though a number of small glands occupy nearly the same position, and have a similar structure. It would be interesting and instructive if we could trace out, step by step, the modifying processes, and understand the conditions that caused the modifications from a harmless labial gland to a poison-secreting gland.

It would seem that it ought not to be necessary, at this day and date, to have to smite another popular illusion about the

rattlesnake. Yet as I am constantly meeting with it in daily life I will refer to it in these pages. It is a popular belief that the number of rattles denotes the age of the snake, there being one rattle or bone for each year. This is utter nonsense. I have found large and old rattlers with but two or three joints, for the rattle is a most delicate instrument, easily broken or injured. The fact is the joints grow at the rate of from two to four each year. One careful observer who reared some snakes in natural conditions found that the joints corresponded with the exuviation (or skin-shedding) of the reptile, and that of two snakes one, at the end of sixteen months, had six joints, and the other seven, though the latter, at one of the exuviations, lost three of the joints. Hence, though both of the same age (sixteen months), one had four joints and the other six, and none but the observer would have known that the four-jointed rattle reptile had lost three of his joints.

There has been much discussion as to the real purpose of the rattle, and scientists have not yet come to any unanimous conclusion. As far as the relation of man is concerned the rattle is a decided disadvantage to the reptile. But, of course, the rattle was evolved long before man appeared upon the scene. It has been suggested that the object of the rattle is to decoy insect-eating birds into the range of the rattler's spring, because even man often mistakes the call of the locust (*Cicada rimosa*, Gay) for the rattle. But how about the facts that rattlesnakes eat comparatively few birds, and that birds in hunting insects seem to rely far more upon their sight than the sounds they hear?

Other learned professors contend that it is for the purpose of attracting the sexes together at mating time, and it has been observed that during a fight with hogs other snakes responded to the rattling of the reptiles that were attacked.

Still another suggests that it may be for the purpose of paralyzing the snake's prey with the sound, but experience demonstrates that animals and birds alike hear it and are both unconscious and unafraid, unless in the very presence of the reptile.

A suggestion that finds much favor is that the rattle is a noise of warning, and therefore part of the defensive armament of the reptile, suggesting to the outsider that the poisonous creature is alert, aware of his presence, and ready to defend himself.

Herbert Spencer believed that the rattling of the snake's tail is like the wagging of a dog's tail, an escape of nervous force which can find no other ready mode of manifestation at the time.

All these theories are interesting and it may be there is a modicum of truth in each of them.

The most practical thing of all, however, is to know how to treat a snake-bite, should one be unfortunate enough to be bitten. Much depends upon the dangerousness of the bite, viz., the depth of the wound, the amount of poison ejected into it, and, of greater importance still, the location of the wound.

Ordinarily few snake-bites reach the veins, hence the action of the poison is slow, and the bitten person need have no fear. The first thing to do is to tie a strong ligature or two between the wound and the heart, wherever practicable. A broad, flat band is better than a string which cuts into the flesh. Tighten this band by twisting it with a stick. This band should be released *for a moment or two* every ten minutes to allow a trifle more of the poison to be absorbed by the system. Now cut with a pocket knife as deeply into the flesh as the snake punctures have gone and make the blood flow freely. Suck out the blood from the wound. This is perfectly harmless unless the person doing it has abrasions of the skin on lips, tongue, or mouth. Now administer a teaspoonful of whisky, *not more*, every fifteen minutes, and get your patient to a doctor as quickly as possible.

There are remedies, however, that one can carry in his vest pocket, and that are as easy to apply as the foregoing directions are to follow. I have had a small case prepared, accompanying which is a small pamphlet giving full particulars of how to use the remedies.

As a rule a horse is afraid of a rattlesnake, especially if it has been bitten. Two lady friends of mine were driving over the desert, and they suddenly came upon a rattler sunning itself in the road. As the horse approached his snakeship drew himself up into a coil, and lifted both his head and his rattle in warning, darting his forked tongue to and fro. The horse, immediately he heard the rattle, backed off, and the ladies, not knowing what was the matter, sought to urge him forward, even using the whip for the purpose. But the horse knew best, and, for-

tunately, the desert being free from gullies, he was soon out of danger, and, making a respectful detour, continued his journey.

The Gila monster (*Heloderma suspectum*, Cope) is seldom seen on the Colorado Desert, though in twenty years I have seen three or four. This is a large, heavily built lizard, from a foot to two feet in length, with short limbs and tail, and entirely distinct from any other lizard of the region, both in its size and stockiness of build. It and the rattlesnake are the only two dangerous or poisonous reptiles of the desert.

Many desert people will tell you that the heloderma has no poison glands and that, therefore, his bite is not dangerous. This error doubtless arises from the fact that there are well-authenticated cases of his bite that have caused nothing more than a slight inconvenience. But it is a most dangerous error. The venom of the heloderma is as poisonous as that of the rattle-

Gila monster

snake, as several people who have been bitten have found out to their cost. For many years I have been investigating this subject and I will make quite clear why some people are bitten by the heloderma without injury and others suffer severely.

The venom glands are situated under the chin — thus being on the lower jaw, instead of the upper, as in the case of the rattlesnake. "They are modified from glands which correspond to the sublingual glands of mammals. There are four ducts leading out of each gland. These ducts perforate the lower jaw and open in front of the grooved teeth. A careful study of the dentition of the heloderma shows that there are several intermediate forms between the unmodified teeth of the reptile and the fully developed poison fangs. The poison glands are compound tubular glands, closely resembling the other salivary glands in structure. The peculiarity of their secretion is to be explained by their physiological activity rather than by their structure." So writes my friend, Dr. C. A. Whiting of the

Pacific College of Osteopathy, who has given some time to the study of the teeth and glands of the heloderma. Though their poison teeth are grooved, there is no direct connection between the poison glands and the teeth, as in the case of the duct of the rattlesnake. The poison flows out onto the floor of the mouth, between the lips and the gums, that is, into the interior of the bottom jaw. Being below the teeth and not directly communicated to them, the poison sometimes fails to find its way into a wound. The saliva of the upper jaw is perfectly harmless, as is also the same saliva in the lower jaw. But it must not be forgotten that there is also a deadly venom in the lower jaw, which gets mixed with the saliva.

As a rule the Gila monster is lazy and sluggish, and one might play with him for hours and keep him as a pet for years and never see any sign of anger. But let him be angered and then he is dangerous. And the real danger comes when, as he bites, *he turns over*. With a vicious lunge he seizes the object and at the same moment turns over with lightning-like rapidity. He can hold on with the tenacity of a bulldog or he can bite so quickly that he "snips" a piece of flesh out easier than one would pinch off a piece of a cracker. I have seen this action a hundred times, and this is what one must beware of. When the reptile thus bites, holds on, and *turns over* the danger of the case is as great as the most dangerous bite of a rattlesnake, for in this position, if the poison glands are active, the saliva and poison commingle and flow freely into the teeth and thus into the wound. As will be seen in my comments upon the chuckwalla, this "turning over" is a habit of the latter reptile. Yet the chuckwalla has no poison glands. There seems, however, to be a relationship in this peculiar habit, which, as far as I know, is confined to these two reptilian inhabitants of the desert. How strange and singular the provisions of Nature for the protection of her various children!

With the chuckwalla the rapid turning over seems to be to give added purchase in biting its enemies or prey. The questions that arise are: Is the turning over of the heloderma for the purpose of rendering effective the working of its poison apparatus? If so, what is the reason of the turning over of the chuck-

walla? Is it a survival of a useless and unnecessary habit in the chuckwalla, seeing that it has no poison to distribute, or is the development of the poison glands in the heloderma a later evolution, while the chuckwalla has evolved in a different line?

The treatment for the bite of the heloderma is the same as that for the bite of the rattlesnake.

In a wild state the heloderma lives largely on birds' eggs, young rabbits, and though apparently so clumsy and slow is an expert bush climber. I have seen him perched high on a mesquite and have been considerably startled at his presence. His five-toed "hands and feet" are well adapted to climbing, which he does both easily and gracefully. Certain specimens that have been in captivity are thus referred to by Professor R. L. Ditmars, their curator at the Bronx Zoölogical Park: "The Gila

Chuckwalla

monster may be placed under the head of omnivorous lizards, as in captivity it feeds almost exclusively upon eggs — the food which most certainly cannot form a large proportion of its nourishment in a wild state. Our captive specimens never have been induced to take other food than eggs, either boiled or raw, the latter sometimes mixed with chopped meat. Unless mixed with eggs they will not eat meat. With stolid indifference they refuse morsels that are dear to the ordinary reptile of their size, such as very young rodents, large grubs, and meal worms. Ants and their eggs are said to furnish a large proportion of this reptile's food, but all the specimens under the writer's observation have refused them. They have lived with us for four years, and have thrived upon their simple and unvarying diet."

In referring to the changes noticed in the actions of captive animals when placed outside and under the influence of the

outer air, sunshine and natural surroundings, Professor Ditmars thus writes of the heloderma: "The most interesting demonstration of this mental change has been in connection with specimens of the venomous Gila monster. In their cages these lizards are the personification of good nature, permitting themselves to be handled in the most unceremonious manner, without the least show of bad temper. Removed to a sand-pile heated to a high temperature under a bright sun, and left for a few minutes, they become different creatures. They will snap viciously from side to side, and resent the least intimation of interference with sharp hisses as they lie open-mouthed, awaiting an opportunity to close with bulldog tenacity upon an offending object. On several occasions when endeavoring to extract poison from these lizards, the writer has been unable to provoke them to bite, but after giving them a sun-bath for a few moments had considerable difficulty in disengaging their jaws from the glass vessel in which the fluid was collected, although the temperature of the outside air and sunlight which had aroused such hostility differed but slightly from the warm air of their indoor cages."

The heloderma is a strictly oviparous lizard. A captive specimen, measuring nineteen and a half inches, deposited four eggs, each two and three-quarters inches long, and one and a half inches in diameter. The eggs were covered with a leathery integument, but, though fertile, the conditions for development were adverse, as, in spite of every known precaution, they shriveled up and their contents solidified.

Few people, save experts, have any idea as to the number and variety of the lizards found even in the limited area of the desert. Van Denburgh names and describes a large number that are found either on the desert proper, in the passes leading into it, or on the surrounding mountains.

All of these species have habits, anatomy, and markings peculiarly their own, which would require far more space than I can afford merely to enumerate. The following general descriptions, with a few specific details of individual species, cannot fail to prove interesting.

Especially would I commend to students of art in form the

markings on the bodies of some of these reptiles. Of their kind there is nothing more beautiful in creation than the markings on the skin of some rattlesnakes and lizards. Nature seems to have provided for every esthetic need of man. Designers for dress patterns, wall-papers, even table-cloths can find suggestions innumerable in these markings; nay, many of them are all ready to be bodily transferred, with such modifications of color as their new uses may suggest, into commercial forms of surpassing beauty. Take, for instance, the markings on the body of the silvery footless lizard, and those of the diamond-backed rattlesnake.

The chuckwalla is the best known of the larger lizards of the desert. It is sometimes known as the Alderman lizard, though its scientific name is *Sauromalus ater*, Daméril. This is one of the most interesting creatures of the desert.

Chuckwalla

The chuckwalla has a body something like that of a toad, flat and squat, about three and a half inches across, with a thick stubby neck, and the head of a lizard. Its head is about eight inches long. The complete length of one specimen that I measured was thirteen and a half inches long, divided as follows: head, one and a quarter inches; neck, three-quarters of an inch; body, four and one-quarter inches, and tail, seven and one-quarter inches. His body was beautifully mottled or spotted, mainly a dark reddish brown, with small spots of orange and cream. The tail was of light gray or cream, and with armored rings. The whole appearance of the body covering was almost that of fine and rich beadwork, the beads being exceedingly small and symmetrically arranged. They were in perfect rows, and the size of the bead (which in reality is a scale) grows smaller the farther away it is from the spine. On stroking the body it felt like a hard-napped velvet, so smooth and fine were the scales, but upon stroking it the other way, or towards the head, it had

a rough and wood-fiber feeling. The color under his stomach was the same as on the upper part of the body, save that it was a little darker.

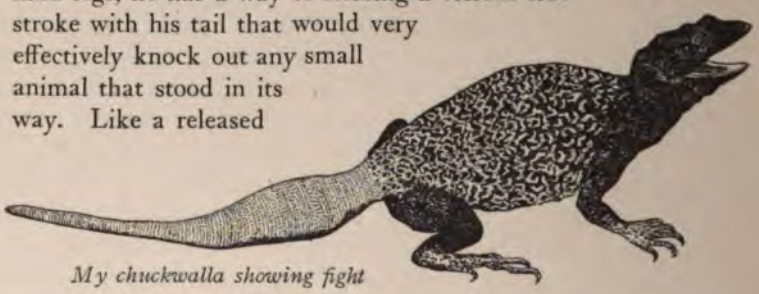
The various specimens of the chuckwalla show great variations in color and in the bands on the tail. The specimen I have before me now has no bands whatever. Van Denburgh says "these may be present or absent in the same individual at different times, and the change seems to be, at least to some extent, directly under the control of the animal."

When my specimen was caught he made show of fight, opening his mouth either in anger or fear, and showing his two rows of saw teeth, that looked almost like very small fish-bones. In the hands the chuckwalla readily subsides and seems thoroughly to enjoy being stroked and petted, especially on the head. He closes his eyes, as if in perfect content, and makes no attempt to escape. The ears have almost the appearance of attenuated fish-gills, and the five fingers of the four feet are a singular combination of bird and monkey claw. When frightened the chuckwalla exhales so that his sides suddenly cave in and then the skin wrinkles up like the face of a very old Indian.

The chuckwalla is doubtless harmless as far as venom is concerned, as the scientists assert, but when angered he is quite vicious, both with tail and mouth. His teeth, however, are not very marked. They are like those of a fish, but his grip with his jaw is strong. He also, like the Gila monster, has a habit of expelling the breath, scarcely a hiss, which is an indication of anger or fear. When he bites viciously he turns completely over, and if the substance he bites is of a yielding nature I have seen him turn with such force as to roll over three or four times. As I write a captive chuckwalla, tied by a string, is at my feet. On poking my pencil at him he bit it so viciously as to cut off the point (with some of the wood), and then, when I shook a paper before him, he suddenly bit that and rolled over three times, so as to completely envelop himself as in a paper wrapper. He coiled the string around his body several times, and I had to turn him back again or cut the string in order to release him.

The Chuckwalla Mountains receive their name from the fact that large numbers are found there. In fact, in all the mountains

between the Salton Basin and the Mohave Desert the chuckwalla is abundant. He loves the rugged, creviced rocks. Here he can lie and bask in the hot sun to his heart's content, and here, in the crevices, he finds shelter and home. The buds and blossoms, leaves and young shoots of the creosote bush give him abundant food, and in the spring at any rate, when the rains have made every plant flourish, he is evidently happy, contented, and well fed. He is a somewhat shy creature, averse to being watched too closely, though somewhat sluggish in his movements, and by no means aggressive when attacked. He slides into a near-by crack or crevice, and lies there as if hoping you will speedily go away and leave him. If you can reach him with a stick and touch his hind legs, he has a way of striking a vicious side-stroke with his tail that would very effectively knock out any small animal that stood in its way. Like a released



My chuckwalla showing fight

spring it strikes "thud," and the tail being covered with a hard armor, the blow is not to be despised.

If you force him to a further retreat he will seek to penetrate to an extremely narrow crack where you cannot possibly reach him. He has powers of compression that are remarkable. But if while in this position you can seize his tail, and think that thereby you have him, you are destined to find out your error. You pull, and pull, and continue to pull, and if your strength surpasses your knowledge you will pull a portion of the poor creature's tail off, but you will make no progress in removing him from his retreat. For a long time I could not see what it was that gave him such a tenacious hold. His claws did not seem strong enough, and on several occasions I was able to pry up the rear legs so that there was no holding power in them, and yet the reptile held on. At last I discovered that when he was entrapped

in this manner he fills his lungs to their utmost capacity. This pushes his body, both belly and back, close to the rocks above and below, and the rough surface of his body then gives him a sure hold upon the rocks. When he is thus wedged in, and it is possible to get at his head or nose, a few prods will cause him to exhale. Then he backs or sidles out as easily as can be, though before you may have thought the crevice so small that he was wedged in and could never escape.

I am not sure but that it is a fiction that it does not hurt a chuckwalla to pull off his tail. I saw two one day, the first of which had lost over an inch and a half of his tail. The other had his full complement. I followed the latter one to his hiding-place, where he showed no fight, but tried to get farther from me in the narrow cleavage of the rock. I caught his tail and pulled. About an inch came off. At that point there was no blood, but a full inch higher up a little blood oozed from between the joints of his armor, and therefore I am inclined to think a wound was caused which produced pain. When I tried to make him show fight by prodding him in front he made no effort to escape, but opened his mouth and seized the brass end of my pencil so that it required a sharp jerk to remove it. There was also a slight frothing at the mouth.

The Indians of the desert, who still live in a somewhat wilder condition than their brothers of the settlements, regard the chuckwalla highly as an article of diet. They waste no time in dressing them, but throw the whole reptile, skin, tail, and all, into the stew pot. The eater of frogs' legs can readily believe what others may rather doubt, that the chuckwalla, properly prepared, is a dish for an epicure. Especially after the spring rains his flesh is white, sweet, and tender, and is not unlike the dainty flesh of the frog's leg.

In our various peregrinations my assistants and I have often seen the chuckwalla climb the greasewood and creosote bushes and eat the young buds. Various dissections have convinced me that he is, as a rule, a strict vegetarian, and I can vouch for the rich delicacy of his flesh. It is white, sweet, tender, and juicy.

Few people, looking at the lizards as they dart to and fro in the sunlight, see any similarity between them and the birds.

Yet all our leading scientists tell us that birds and lizards are so closely allied, share so many and important structural characteristics that they are united in one group — the vertebrates, or animals with a backbone. So careful a scientist as Huxley declares that the chief or most positive difference between reptiles and birds as we know them to-day is in the matter of feathers.

In other words, the bird is but a reptile covered with feathers. Yet, to our unaided eyes, how wide the gap seems, and what a reflection it is upon our so-called "instinctive feelings." We shudder with horror and disgust at the sight of a lizard, while we exclaim with rapture at the sight of a bird.

Yet to the unprejudiced eye — and I think mine is one — the beauty of the lizard does not suffer in comparison with the beauty of the bird. The colorings and markings of the one are as exquisite and perfect in their way as are the feathers and colorings of

Burnett's alligator lizard

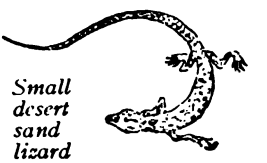
the other. And while nothing can be compared with the graceful flight of the bird, it cannot be denied that the graceful and easily fluent motion of the lizard is a matter of wonder and delight to the observer.

Birds have peculiar breathing powers, owing to the hollowness of their body structure. Lizards, too, have the power of breathing when buried in hot sand. Birds molt their feathers at stated times, and so do most reptiles, the only difference being that the feathers of the birds come out one by one, while the scales of the reptile, with the entire skin that holds them, come off at one and the same time. We are all familiar with the shedding of the skin of the snake. The reptiles do the same, yet few of us have realized that these two apparently dissimilar operations are practically one and the same thing. And while the shedding of the bird's tail may not seem to have anything to do with the ease with

which one can pull off the tail of a lizard, it is a remarkable fact that both bird and lizard have the power to grow a new tail in about three weeks when the conditions are favorable.

The eggs, too, of the lizard are exactly the same as those of the bird, save that the latter have a lining shell, while the former have only a thick, membranous integument. The lizards lay their eggs in the warm, moist earth, never in dry sand if they can find the moisture, and leave them for the sun to mother.

When they are small how puny, cunning, and interesting they are! How curious they are! If curiosity is preëminently a human trait it is one that has descended from a long line of ancestors, beginning with the lizard, for as soon as he sees anything strange he first squats down, as if to hide, and then, overcoming his fear, he must see what goes on. Stretching his legs to the utmost, he rises, as it were, on tiptoes, cranes his neck, looks intently and at the slightest movement squats down again with great rapidity, to repeat the stretching and peeking as soon as he thinks it is safe.



Small desert sand lizard

One seldom sees lizards out early in the morning. They love the warmth, and wait until the sun has risen. I think I never saw one, except in a very exposed place, until after seven o'clock in the morning.

The desert whiptail, commonly called the snake-lizard (*Cnemidophorus tigris*, Baird and Girard), is a long, beautifully colored, and graceful creature, that is not unlike a snake, with four legs added as an afterthought. The body is a rich, old gold green, the head almost black and spotted with a greenish bronze. He waddles along in a slow and deliberate manner, over, under, and around the rocks, seeking his food, but when scared or pursuing an insect he can dart with great rapidity. I have seen one leap a distance of two feet with perfect ease.

One very interesting lizard is the desert night lizard (*Xantusia vigilis*, Baird), quite a number of which are found in the region of the Devil's Garden, northwest of the San Gorgonio Pass. This peculiar lizard seems to love the tree yuccas and is found in quantities in the dried trees, stems, and branches that are rotting

on the ground. In catching them one has to be quick and expert or they waddle away with fair speed, and invariably aim to get under one's shoes or even up one's legs. They possess the power in a marked degree so common to many of their class, not only of adapting their color somewhat to the soil of their habitat, but of becoming lighter colored when exposed to the light of day. As night approaches they turn dark again. These changes take but a few minutes to accomplish.

This species of lizard is ovoviviparous, giving birth to fully developed offspring, as many as three having been known to be born at one time.

The most beautiful lizard I have ever seen I caught on the Colorado Desert in 1906. It is the leopard lizard (*Crotaphytus wislizenii*, Baird and Girard), and is known to the miners and teamsters of the desert as a "man eater." The reason for this name is clear. The markings on the back of this species of lizard are all suggestive of the rich markings of the man-eating leopards or tigers of India.

The banded Gekho lizard

This little creature had lost part of her tail before I caught her. She was very swift and I had a long chase before she was captured. Her body is a rich brownish cream, with markings of a purplish black. Irregular lines occur in this beautiful black that yet preserve a certain conformity and appear the same on each side of the center line. The design of these lines is made up of small dots, no two alike, in the approximate center of which a tiny speck of black and red surrounded by infinitesimal specks of variegated color or tint occurs. Sloping down on each side of the body to the hind legs she has a greenish tinge, and the whole body, from head to tail, is iridescent and exquisite beyond the power of words to describe. The "texture" of the body is as fine as velvet to the softest touch, and the tiny creature seems to enjoy being stroked and caressed. I had to carry her nine miles in my hands as I walked in the hot sun, and every once in a while she made a vigorous struggle to escape, as a cat held on one's

lap will, but there was no viciousness or attempt to bite. Once when I was writing she was at my left hand on the desk, her forelegs stretched up to their longest capacity and her head on one side peeking at me with the greatest curiosity. To keep her out of the reach of possible dogs or cats I placed her on the top of a polished bookcase. But it was very uncomfortable for her, for she could not travel on a smooth surface. Her legs worked with great rapidity and she struggled to escape with an effort that was pathetic, and yet it was all in vain. She scarcely moved a half an inch as the result of all her efforts.

I brought her home with me in a box containing a chuckwalla, and barely had time to unpack them one morning before hurrying to catch a train. In the haste the lizard could not be seen, but soon afterward my daughter found her, and, not knowing what to do with her, telephoned to Mrs. Elizabeth Grinnell, the well-known student and authority on birds and lizards. She replied that the best thing was to put the little creature in a box or other receptacle, with plenty of sand on the bottom. As no box was handy a round zinc wash-tub was found, with sides a trifle over a foot high. Dry sandy earth was put on the bottom and the lizard duly installed. For food "sow bugs"—as they are called—were hunted for, but she despised and studiously rejected them, while live flies were eaten up by the half-dozen. When thirsty, it was both interesting and comical to see the little creature lift up and throw back her head, and stretch her forelegs as if trying to turn a back somersault, and then eagerly lick with the tongue the drop of water held on the extended finger.

Horned toad

In the house she became very slow and torpid and evidently glad to be handled, and so every once in a while I would take her out of her tub and hold her in my hands. The mornings being cool we invariably heated a rock for her, and then she stretched out at full length on it and enjoyed the warmth to the full. In the middle of the day when I could so place her tub as to catch the direct rays of the sun she became very active and would run around and try to jump out of her place of confine-

ment. I have watched her for half an hour at a time, after the sand was thoroughly warmed, trying to leap out. Stretching up eagerly from the highest part of the sand, she would look toward the edge of the tub, gather herself together and make a leap. It was a trifle too high, however, for her to escape, though a few times her claws caught upon the rim and she was able to pull herself over.

When wearied in the daytime or when ready to go to rest at night she buried herself in the sand. For this purpose her nose was well adapted. It is of a peculiarly rounded form, flat underneath and somewhat shovel-formed above. Her use of this shovel-shaped nose became very apparent as we watched her burying herself in the sand. Drawing back, as if for a veritable dive into deep water, she plunged forward with a quick, decisive motion, wriggling her nose into the sand as she pushed herself forward. Much quicker than I can write it, she completely covered her body, where she lay squat and still until ready to come out again.

Horned toad

With great regret I parted with my pet and committed her to the careful keeping of Professor Ditmars, who now has her safe, I hope, in the Zoölogical Park at the Bronx, New York.

The horned toad is another of the peculiar denizens of the desert, though by no means confined to it. I have found several varieties of the horned toad on the Colorado Desert, chief of which is the one named after the desert (*Phrynosoma platyrhinos*, Girard).

In the course of a week's wanderings on the desert one will see scores of these interesting little creatures. In color and design they are often markedly different. Whether this is the result of age, of variety in food, or of different environment I cannot say, though differently marked toads will be seen within a mile or two of each other and in a very similar habitat.

One of the most beautiful is where the design is picked out in blacks, brick-reds, and creamy white. These colors are not all

absolutely of one shade. They gradate in tone and this adds a subtle charm to the general beauty.

Yet in movement the horned toad is slow and peculiar and the spines on his head and back give him a singularly grotesque appearance. These doubtless are the reasons that so many people are interested in them and make pets of them. They tame readily and will soon come and take flies and other insects from one's fingers. Van Denburgh tells of one of the most singular characteristics of the horned toad as follows. I copy the quotations from other writers just as he has them: "Individual specimens which have been recently caught often show considerable anger when handled, puffing themselves up and hissing fiercely, seizing their tormentor's fingers with their impotent jaws, or throwing at him a stream of blood from the corner of the eye. It is said that Mexicans call them sacred toads because they weep tears of blood." The best account of this most curious habit has been given us by Dr. O. P. Hay, who, writing of a specimen of *Phrynosoma frontale*, says, in part:

" About the first of August it was shedding its outer skin and the process appeared to be a difficult one, since the skin was dried and adhered closely. One day it occurred to me that it might facilitate matters if I should give the animal a wetting; so, taking it up, I carried it to a wash-basin of water near by and suddenly tossed the lizard into the water. The first surprise was probably experienced by the *Phrynosoma*, but the next surprise was my own, for on one side of the basin there suddenly appeared a number of spots of red fluid, which resembled blood. . . . A microscope was soon procured and an examination was made, which immediately showed that the matter ejected was really blood. . . . There appeared to be a considerable quantity of the blood, since on the sides of the vessel and on the wall near it I counted ninety of the little splotches. . . . The next day . . . I picked up the lizard and was holding it between my thumb and middle finger, and stroking its horns with my forefinger. All at once a quantity of blood was thrown out against my fingers, and a portion of it ran down the animal's neck; and this blood came directly out of the eye. It was shot backward and appeared to issue from the outer canthus. It

was impossible to determine just how much there was of the blood, but it seemed that there must have been a quarter of a teaspoonful. I went so far as to taste a small quantity of it, but all I could detect was a slight musky flavor.

" Mr. Denton . . . has communicated to me his experience with a horned toad at Sonora, California. . . . He was gently stroking the animal on the back, when it appeared to look at him as if taking aim, and then, all at once, a stream of blood was shot into his eye. There was so much of it that it ran down on his shirt bosom. He thought that there was between a tablespoonful and a teaspoonful. The blood was shot out with so much force that some pain was produced, and there was pain felt for some little time, though this ceased as soon as the blood was wiped out. The next morning the eye was somewhat inflamed, but this condition soon passed away. Not long afterward, perhaps the next morning, the animal squirted blood out of the other eye."

Mr. Vernon Bailey, who caught the horned toad which afterward became the subject of Dr. Hay's article, writes:

" On taking it in my hand a little jet of blood spurted from one eye a distance of fifteen inches and spattered on my shoulder. Turning it over to examine the eye, another stream spurted from the other eye. This he did four or five times from both eyes, until my hands, clothes, and gun were sprinkled over with fine drops of bright red blood. . . . About four hours later it spurted three more streams from its eyes." I myself have observed this strange performance twice, only in these instances the blood was not projected forcibly but trickled down the sides of the lizards' heads.

Upon this remarkable habit of the horned toad Professor Ditmars gives his experience as follows:

"Various disputes have arisen over the possibility of this occurrence. Over two hundred specimens, representing different species, were examined. These were teased and provoked most persistently by the writer and the keepers, but without result. Their general attitude was to feign death, with eyes closed. They seldom attempted to bite, but when placed on the ground would make off with great show of speed.

"During these investigations Mr. Otto Eggeling of this city

received a consignment of five hundred horned lizards, and with the idea that from this large number there should be some display of the habit — if it existed — he transferred them from one box to another, with vigorous handling. Mr. Eggeling states that although some struggled energetically to escape from his grasp, some feigned death, and a few made feeble efforts to bite, no jet of blood was ejected from a single individual. Subsequently Mr. Eggeling has received other shipments of horned 'toads,' aggregating a total number examined of about eight hundred, and thus far he has failed to observe a single instance of the interesting performance that has been accredited to these creatures. With eight hundred of these lizards examined by Mr. Eggeling, and over two hundred by the writer, it appears that over a thousand specimens of these lizards, representing principally the species *Phrynosoma cornutum*, *P. coronatum*, and *P. plainvellei*, have passed careful observation with no exhibition of the very eccentric habit referred to. It therefore appears that the performance described by Dr. O. P. Hay must be limited to a very small proportion of these creatures, or was accidentally elicited by some unique measure not practised during our investigations."

Desert tortoise, top view

Personally my own experience has been like that of Dr. Ditmars. I have aroused the toad so that his eyes have been suffused with blood, but I never got one angry enough to eject the blood. Yet friends, scientific and others, in whose word I have the most implicit faith, tell me that they have witnessed it so often that they gaze at me in astonishment when I tell them that I have never seen it.

Be that, however, as it may (as I fully accept the testimony above given), I can state most positively that the chuckwalla, when teased or angered, will eject water from his eyes — enough to cause surprise to the beholder — say from twenty to forty drops. I do not recall that any observer has yet noted this fact which I have witnessed again and again.

In certain localities the desert tortoise (*Gopherus agassizii*, Cooper) is quite common. I have picked up five specimens in one afternoon, and a friend of mine eight in two days. Three fine examples are walking around my feet now as I write, and one is quite companionable, for he wants to walk all over my desk when I lift him up. He has no objections to my scratching his head and gently rubbing the soft part of his flesh between his head and legs. The shell of this particular tortoise is nine inches broad and eleven and one-half inches long. With head and tail extended he would be fully three inches longer. His markings are very beautiful as will be seen from Mr. Eytel's drawing. While he draws his head in with great rapidity he shows little fear when I take him on my lap for further examination. His eyes are large, bright, and clear, and have an opaque covering which slides over them from the front backward at will. The eyelid covers from below. While the top of his head is as hard and scaly as alligator skin, the tip of his nose is soft and sensitive. In traveling he feels with his nose. It is his organ of touch. His front legs are — I scarcely know what shape to call them, but more awkward and clumsy looking contrivances could not be planned. When folded up in his shell they double up, the hand with its five horny toes (fingers or claws) shutting inside, the whole presenting a solid and armored front to the foe, for the exposed parts of the legs are covered with a scaly armor that is very tough and impenetrable. The rear legs (fitted with only four toes) are more like those of an elephant than anything else I can think of, especially when he stretches them out, and his tiny, pointed tail is capable of being folded up so that it does not appear. When molested or afraid he instantly draws in head, legs, and tail, thus completely closing up both front and rear apertures and presenting nothing but armored surfaces to his enemies.

Desert tortoise, bottom view

Yet though so clumsy looking he is a more rapid traveler than one would imagine, and his distances lead one to believe that Æsop knew what he was talking about when he made the tortoise win the race with the hare. He can walk fully a dozen miles

in a dozen hours, and when it comes to burrowing, I have seen one make a hole in the ground with — while not the rapidity of the dog — far greater sureness and persistence. They can scoop out the earth and throw it behind them with accuracy and speed.

In walking he first reaches out with the left front foot, then right rear foot, right front foot and left rear. The forefoot is lifted awkwardly, and on placing it down it rests first on the inside toe and then upon all the others in order, and, as he progresses, finally upon the ball of the foot, to be lifted again, reached forward and replaced upon the first toe, etc. As he rests his weight upon it he gives it a partial twist as the corresponding rear foot is raised for its progressive motion. The rear feet rest upon the ball of the foot and toes simultaneously, just as the elephant's does, if my memory serves me correctly.

The reach of the tortoise is very irregular, but rather remarkable. Here are the successive reaches of his left front foot, in inches: 5; $3\frac{3}{4}$; $5\frac{1}{8}$; $6\frac{1}{2}$; $4\frac{1}{2}$; $5\frac{1}{2}$; 7; $5\frac{1}{2}$; $6\frac{1}{4}$; 5; $4\frac{1}{4}$; $7\frac{1}{8}$; $6\frac{1}{2}$; 4.

When alarmed he can not only take long strides (as some of these indicate), but is able to go at considerable speed, fully two and one-half miles per hour.

In color the shell is blackish brown on top and lighter beneath, with the peculiar horn-like color showing even in his rough and unpolished condition. The under shell or plastron, as will be seen from the drawing, has a front extension upon which the head rests and slides in and out. This also serves another most valuable purpose. When traveling over rocky surfaces, the turtle must sometimes drop from one level to another. I have seen them fall fully two feet. In walking they come to the edge of such a place, calmly look over, indifferently give their shell a push as far as possible with their hind legs, and then with one or two more vigorous pushes thrust themselves over, to fall upon this plastron extension. If it were not there the head and neck would most certainly be injured. At the rear of the plastron the bone is curved in to allow room for the tail and anal vent.

For a few weeks I had four of these desert tortoises on a lawn in Pasadena, and spent many hours watching them. Occasionally I would bring the large one into my library for study,

and he would wander about, peering at everything on his level with the greatest apparent curiosity.

While walking the flies often settled on his nose and bothered him considerably. It was quite amusing to see the comical fashion in which he would stop and, twisting his nose toward his awkward elbow, give his nose a rub, straighten out and proceed. He evidently does not approve of the flies of civilization, for, while it cannot be denied that there are flies on the deserts away from the haunts of men, it can safely be asserted that the proportion is as one to a million in favor of the wild places.

Scorpion

When I tickle him between his neck and legs he exhales with a kind of half-grunt, and I can compare the noises he makes at such exhalations to nothing more exact than the inarticulate "guggling" of a young baby when content with full feeding.

The desert tortoise is peculiar in that he has no teeth. The lower jaw is most peculiarly constructed. The whole front of the jaw is of bone, with a slight suggestion of notching. At the rear of this exposed part inside the mouth is a parallel sharp ridge of bone or horn, thus forming a kind of groove with the outer jaw and where the teeth would ordinarily be placed.

Scorpion

As far as I have seen and can learn he is a pure vegetarian. He is very fond of the leaves and young shoots of many of the desert plants that are thriving at this time,—after the spring rains. All those I have caught have their jaws stained green with their recent feeding.

Mr. E. T. Cox, writing about the desert tortoise in the *American Naturalist*, says: "In preparing this specimen, I found on each side, between the flesh and carapax (the upper shell), a large membranous sack filled with clear water; I judged that about a pint ran out, though the animal had been some days in captivity and without water before coming into my possession. Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling

in with one of these tortoises and aware of this fact, need have no fear of dying for immediate want of water."

As yet I have not brought myself to the slaughter of one of these creatures, and the men of the desert who say they eat tortoises have been able to give me no information as to the facts stated by Mr. Cox.

I have spoken to teamsters and miners who have often caught the desert tortoise, and they agree that they must have an extra water supply. But their observations necessarily were cursorily made, and I have not met with one who has dissected the tortoise. They invariably speak of the fact that when first picked up they evacuate to the amount of two or three large tablespoonfuls of clear liquid, which, however, they regard as an incontinence of urine caused either through anger or fear.

The desert tortoise is good for food, especially the flesh of his four legs. When put in hot water the scales peel completely off, and a rich, delicate flavored meat is left which epicures claim is most delicious.

Centipede

At one camp we stopped at, on one of our trips, the owner told us of his first experience in eating the desert tortoise. Said he: "I had a Mexican, Carlos Diablo, working for me. Once he spoke enthusiastically of the wonderful feasts he used to have on 'tortugas.' I paid little or no attention to him as I thought he referred to the tortugas — turtles or tortoises — of Florida or Mexico, in both of which countries he had been. It turned out later that he meant our desert turtle, and my curiosity being aroused, I told him I should like to see how it tasted. Not long after he caught a fine large turtle, and after he had killed it and completed the hard task of removing the shell and skin, he boiled the flesh during a whole night, seasoning it with salt, red pepper, and garlic. It was delicious, and I only wish I could serve you some now that you might see what fine food the desert provides."

My four specimens are now in the Bronx Zoölogical Park, New York, where I was compelled to send them, as my many absences from home render it impossible for me to keep them.

There are scores of red ant-hills on the desert, appearing like

small craters rising from the sand or gravel. Many of them are perfectly formed as to shape, and a few have the peculiar color and granulated appearance as if made of grape nuts. The material of which the "crater" is made is slowly and laboriously brought up from under ground by the ants. They are indefatigable miners and this is their waste pile. But they are not mining for the discovery or exploitation of minerals or any substance they find beneath the ground. They are merely excavating for a home and storehouses. This work is generally done in the early morning. Foraging on the outside comes later in the day. They come through the vent with a piece of stone in their antennæ with which they slowly climb up the side of the crater. A few conscientious workers carry their pieces to the top where they "dump" them to roll down on the outside. Others just find the nearest and most convenient spot, drop their burden and return for more.

Tarantula

The largest caterpillar I ever found on the desert was in April, 1906. He was on the stem of a plant which I failed to note and was fully two inches long. He had three pairs of legs very close together at his head, four pairs at regular intervals on his body, and one at his tail end, above which a brownish speckled horn, nearly half an inch long, was exalted. His body was striped green down the center, with a black stripe on each side of this, followed by a narrow green strip and a narrow black strip. Then there came a broad strip of green, and at the junction of sides and belly a slight strip of spotted red and black. There were touches of red at regular intervals on the upper black stripes.

Tarantula

Though as a rule there are few mosquitoes on the desert there are times when they come in swarms. In the year 1900, in June, not far from Imperial Junction there seemed to be a breeding place for them. Their numbers were countless and they made sleep at night impossible. The same year and at the same time, or a few days later, a few miles from Yuma, near the Colorado River, they made life a burden. Constant smudging, day and

night, was necessary. A work train was sent to do some special work on the railway, and at times the workmen were so distressed that they grew frantic and threatened to quit work to a man unless they were given a few hours' release. To accord them a little rest the train was brought up to Ogilby and then provision made for keeping smudges going during the rest of the time the work was progressing.

The tarantula (*Mygale avicularia*) is occasionally seen on the desert. It is nothing but a large, hairy, overgrown spider. There are two or three different species, but except to the entomologist the differences seem slight. They belong to the trap-door spider family.

The great foe to the tarantula is a hornet or wasp-like insect called the tarantula hawk (*Pompilius formosus*). The female, when ready to lay her eggs, flies eagerly about looking for a tarantula. As soon as she sees the great, hairy-bodied spider, she alights upon it and with the speed of a flash of lightning darts her sting into it. There must be some preservative quality in the poison she injects, for, while the insect dies, its body does not decompose nor dry out. It has not yet served its purpose. Digging a hole some five inches deep the hawk now rolls the body of the tarantula into it, and deposits her eggs either in or on the body. She now closes up the nest. When the larvæ leave the egg they find themselves supplied with food enough to last until they are fully grown. All the transformations occur in the underground nest, and finally the adult insect emerges after reaching its perfect stage.

Tarantula

The dinapate is one of the largest beetles of its family and is also one of the rarest in the world. It was originally found by an entomologist named W. G. Wright in the wild palms of the Colorado Desert. Year after year he visited these palms and secured as many beetles as he could, collectors being anxious to obtain them.

In January, 1886, a description was published in the "Transactions of the American Entomological Society," by Dr. G. H.

Horn, of a large beetle, larger than any *Bostrichide* known, which was said to have been found on the Mohave Desert. It was named *Dinapate wrightii* after its finder. Little was known of its habits or that of its larvæ, as no one but Mr. Wright knew of its existence. But in 1897, H. G. Hubbard, one of the most enthusiastic entomologists of the United States, started out on a still hunt for the beetle and its life habits. He found that it was not an inmate of the Mohave Desert, but of the Colorado, and that it made its home in the giant fan-palms indigenous there (*Neo washingtonia filifera*). For over a month Mr. Hubbard climbed up and down the steep canyons trying to find what he was so desirous of finding, a colony of the larvæ of this wonderful beetle in one of the palms. His searches were ultimately rewarded. He first found a dead and disintegrated specimen of this gigantic Bostrychid beetle lying between dead fans at the foot of a young palm. Says he: "Many of the old palms are uprooted by the flood waters, and I saw probably fifty of these prostrate trunks upon the ground. Almost all of them are perforated all over with round open holes, into most of which I can insert the end of my thumb. Some of the holes will, however, only admit the little finger. These holes, evidently made by dinapate larvæ, open directly into a huge pupa chamber which is two inches long and lies vertically with the grain not more than one or two inches from the surface."

Tarantula hawk

He found the logs showing from one hundred to two hundred and fifty holes of exit of the larvæ, and concluded that once a log is vacated by a colony of them it is never again attacked, for the reason that all its nourishment is completely eaten out.

The female cuts into the trunk of these giant palms and there deposits her eggs. When it is remembered that the fan leaves falling around the trunk make a covering from *eight to ten feet thick*, it can be seen what a great borer the beetle must be to cut its way through into the trunk. No living tree is ever sup-

posed to be attacked by them, though it has been suspected that the dinapate herself kills the tree in order to make a home for her eggs. On this matter Mr. Hubbard writes: "When I consider the limited number of these trees (palms) in existence in a wild state, and the slender chance the female beetle must have of finding a dying tree in the right condition and at the right time, I am more than ever inclined to suspect that the beetles deliberately kill the tree in which they oviposit. If they killed the tree merely by feeding as adults upon the buds there would be many trees killed, for often more than two hundred adults issue from a single infested trunk."

The larvæ remain in the trunk one, two, or possibly three years ere they emerge as full-grown beetles, and during this time they tunnel the palm into a series of galleries in a truly marvelous fashion. "It is hard to realize the enormous extent and dimensions of the dinapate galleries," says Hubbard. "Not the largest of our Florida palmettos could support more than three or four of these larvæ; they would eat it all up and then die of starvation. If there are twenty or thirty holes in one of the Washingtonia palms, one finds the interior entirely eaten out from end to end, and one can follow the galleries, over one inch in diameter, for twenty feet up and down the trunk following the grain and without diminishing sensibly in diameter. Then think of the yards and yards of smaller galleries made by the larvæ while still young. Such extensive and prodigious borings cannot be made in one or two years, and certainly not in any tree trunk of moderate size. There is certainly no other plant here than this Washingtonia palm that is capable of supporting a brood of these huge and voracious grubs. Therefore I do not hesitate to assert that they exist only in the Washingtonia, and that they are very certain soon to become extinct. I regard the discovery of a colony as one of the most interesting entomological events of my life."

The Dinapate wrightii, the large beetle found in the desert palms

He took four pieces of the trunk, containing the larvæ, into his bedroom and during the night enjoyed hearing them cut the

fiber with a snap like a pair of scissors. In June these pieces were sent to Washington and in August a small number of the beetles were bred from the wood. This was a matter for great rejoicing. Mr. Eytel's drawing is from a photograph of one of these bred specimens.

Mr. Wright's operations in the first instance were carried on with great stealth. He did not want others to know of his find. In his eagerness to get the rare beetles he cut down a number of the palms, but as they were already dead this was not a serious injury. When the holes were seen by the people at Palm Springs they deemed them made by carpenter-bees.

The dinapate has been called the dodo of beetles, both on account of its size and also that it is supposed to be almost extinct. It is a large black beetle, fully an inch in length, the female being larger than the male. It has a strong frontal plate and the great jaws of the pupæ are wonderfully adapted for the work of cutting their way through the fibrous part of the palm in their search for food.

The entomologist will find the Colorado Desert a rich field. It has never yet been fully explored, and new species are pretty sure to reward the man who is willing to make the desert his abiding place for a while and penetrate, as does the prospector, into its secret recesses. Near the river there are numbers of a fine green Buprestid (*Gyascutus planicosta*), easily caught in the early morning hours. The click-beetle (*Chalcolepidius webbii*) is abundant on the willows. It reaches a length of nearly an inch and a half, and is bluish in color with a broad cream-colored border. To merely mention the desert species would fill several pages, and while, of course, many of them are to be found elsewhere, those that appear on the desert are often modified by the peculiar conditions that exist there.

One interesting feature of the desert insects is that during a dry year the eggs and pupæ will be in a dormant state. Or, at least, this is the supposition of entomologists most familiar with desert conditions. Either this is the case or the beetles that reach a mature condition are so few as not to be seen. Experiments have confirmed the former view, for eggs and pupæ have been submitted to adverse conditions and it was found that this arrested

their development. The fertility of the eggs was not impaired, and the following season, when favorable conditions existed, full development followed.

The best time by far for the entomologist on the desert is during or immediately after a long wet season. These seasons rarely occur, but when they do an abundance of rare objects is sure to appear. Not only an abundance in the variety, but also, as in the case of the dinapate, an abundance of one particularly rare species.

Dinapate

Gila monster

CHAPTER XIV

Plant Life on the Desert

CLASS unto themselves, the plants of the desert are set apart. Or at least that is what they seem when you make your first cursory survey. Extended observation, however, demonstrates that, while there are marked desert features in many plants known elsewhere, and quite a number that are confined to the desert, there is not as much difference, after all, between the flora of the desert and that of the more fertile areas. It is the conditions that make the differences. Plants, even as animals and man, find life a hard struggle upon the desert, and yet, with a picture in my mind's eye of the rich and glorious beauty of the flowers as we found them in various almost unknown desert valleys in March (1906), where they flourished in luxurious abundance and marvelous variety, such words seem utter nonsense. But one might travel on the desert for years and not see such a display. In twenty-five years of winter and summer experiences, this was the first time I had been so privileged. The facts are, that to most plants the fierce heat and the lack of moisture render growth most difficult, and that,

except when freshened up and brightened by the rains, most of the trees and bushes have a bleached, blonde, bloodless appearance that adds to the neutral, colorless effects of the floor of the desert.

Seen when rain has been scarce even scientific observers come away railing at the scarcity of plant life, and the almost waste of time their search has proved to be.

Dr. John L. Le Conte, of the California State University, who visited the desert in 1850, was not impressed by what he saw. He says the only resources to shorten the way were very limited geology, and, as may be inferred from the nature of the country, "equally poor botany. It is no wonder that government reports abound with names of plants which suggest nothing but linguistic difficulties, for there is little else in the vast deserts to occupy the attention of the intelligent traveler; and with the determination of one resolved to struggle with the dull sublimity of inorganic matter, he frequently breaks off and preserves a piece of some hideous vegetable, whose only charms are the ugliness of its form, the lifelessness of its color, and the apparent absence of flower and foliage and everything else that renders a plant attractive."

Wild heliotrope (*Phacelia aanacetefolia*)

There are times when these severe strictures upon the floral presentations of the desert seem to be deserved. At others they would appear to the most casual observer to be unmitigated untruths and impossible slanders.

This fact cannot be too strongly impressed both upon my readers and desert visitants. It is a place of contrasts, marked and vivid. Plant life is no exception to the general rule. One year, one month in the year it dazzles, startles, delights, enchants with the reckless variety and profuse gorgeousness of its floral display, and then eleven years, or eleven months (speaking figuratively), it would nearer fit Dr. Le Conte's depreciative view.

Photo. by H. C. Tibbitts, San Francisco, Cal.

MESQUITE TREES ON THE COLORADO DESERT

These very facts are one of the desert's allurements. If in your association with some person you know there is a possibility that you will strike him at a time when he will far transcend ordinary mankind in the brilliancy and charm of his conversation, you will be willing to undergo considerable boredom to catch those rare flashes of genius and mental glory. So with the desert. And yet I wish also to assert in the most forceful manner, that if one can go to the desert in the receptive spirit at any time, he will find the plant life of the most restrained period of growth more than interesting. It is fascinating. The cactuses alone are a most fascinating study, and when to these are added the peculiar desert trees and plants, the botanist has a field rich, rare, and delightful.

"Hen and chickens" (Cotyledon pulvcrulenta)

Plant life on the desert has a wonderful vitality, or Nature has a marvelous way of caring for it, for after a rain the flowers spring up in a profusion and variety that are as bewildering as they are delightful. Here are flowers that one seldom sees; not a few; nor are they poor specimens, but in great quantities, and full grown. One drives over mile after mile of them, fascinated and entranced. They are worthy children of noble sires. Whence came they? Are they natural products of the desert? I scarcely think so! It seems to me it is far more likely that they have been preserved from some far-away, long-passed epoch of Time, when the desert was more hospitable and kind to flower and animal. As the climatic and other changes have come the seeds have been preserved in the earth, lying dormant perhaps for long decades, or even centuries, deep below the surface. Then fierce rains, cloudbursts, floods came and almost uncovered them, leaving them with just enough of protection to give shelter and moisture, which, in the heat of the sun, caused germination. Then the eye

of the solitary desert traveler was charmed and delighted by the new floral treasures suddenly called forth in such wealth and profusion. For a few short days he enjoys them to the full, then they die down and are not seen again, perhaps, for several years.

It is wonderful how desert plants and trees reach out for water. One day I saw exposed what appeared to be an insulated telephone wire of a deep reddish brown color. It was the root of a bush that seemed quite dead until I carefully examined it, and then you saw that it was very much alive. The root was exposed by a winter freshet, and as I pulled it I dragged out more until there was over twenty feet of it. It is this power of reaching out for water, this persistence in clinging to a life that seems almost hopeless, that give one such an admiration for the brave struggles of these desert plants. They persist in living. They are unconscious examples of the strenuous life. They know, or at least seem to live as if they knew, that there is no attainment without constant and strong endeavor.

Then, too, what a difference there is between the cultivated garden and the natural growth of flowers in the desert! In the garden everything is forced, artificial, conventional, in bonds. Every flower must grow where it is set, and it is trained and trimmed and tied and directed into a stiff primness that some people regard as beauty, but that a large-minded soul cannot help but feel is a torture and a spoliation of the real life of the flower. But in the desert all is free. Liberty is supreme. Every flower grows when, where, and as it will; and there is a spontaneity, a wild, glad, joyous giving apparent in every flower that grows, as if it were conscious of the fact that it gives of its sweetness and beauty, not at the behest of a gardener, but of its own gracious will. This is the charm of the flowers we see and enjoy in the desert valleys.

In his incomparable prose-poem "The Desert," Dr. John C. Van Dyke says: "Many tales are told of the flowers that grow on the waste after the rains, but I have not seen them though I have seen the rains." How I wish the distinguished writer could have been with me on the trip to the Brooklyn mine in April, 1906. In the Crawford Valley (as well as others) the desert set forth a display of flowers that I have never before seen equaled.

I have been at flower shows, have reveled in the floral treasures of emperors, kings, queens, and nations, have been entranced by the horticultural glories of Kew Gardens, Kensington Gardens, *les Jardins des Plantes*, and the great displays at numbers of World's Fairs, yet I speak the truth with calm sobriety when I say that for splendor and immensity of display, everything else seen in the whole of my life put together was not to be compared with this. Possibly the San Joaquin plains, as described by John Muir and Madge Morris, in the early days before many white feet with their "civilizing" destruction of nature's glories had trodden upon them, may have been equal to that which we saw. Mile after mile, straight ahead, behind us, and on each side, were carpeted with flowers. To merely name them would take several pages of this book, and to give adequate descriptions would need a volume. Here were phacelias, rare and beautiful asters, and gilias that excited the cupidity of expert botanists when their eyes fell on them; thousands of specimens of *Mohavea viscidia*, their primrose leaves dotted with reddish spots, and many varieties of erigeron. The enotheras were marvelously represented, and, as in the flowers of the cactus, these desert specimens were unusually delicate and beautiful in coloring. Lupines, borages, kramerias, mentzelias — but why merely name them? Suffice it to say that hours were required to merely go over the specimens we brought home.

Gum plant (*Grindelia cuneifolia*)

In their growth and native arrangement they often delighted beyond measure. A richly green creosote bush would be surrounded by the flowers in circular beds, but devoid of the rigidity of division that ordinary gardeners seem to prize, and that Nature ever abhors. First there would be a circle of blue, then white, yellow, pink, white and yellow, terminating at last in a long approach of a rare and beautiful gilia. Sometimes these gilias were white, but there were equal numbers of pink, and yellow.

Altogether the picture of the flowers of Pinto Valley has made an epoch in my memory. *That* is one of the things I can never forget.

There is no doubt that to the plant life some of the healing virtues of the desert are attributable. The air is often redolent with the pungent odors extracted by the fierce sun from the plants, which, full of resinous and other oily substances, render them forth only on such strong persuasion. Being thus held in suspension in the atmosphere that closely hugs the earth, they constitute of it a specially medicated area in which every breath taken, whether through mouth or nostrils, penetrates to the bronchial tubes and lungs and deposits there the tiny particles of healing virtue. Here is the *vis medicatrix naturæ* at its best.

Desert thistle poppy
(*Argemone platyceras*)

Among other plants one here finds the wild tobacco, which with its large long leaves and rich yellow blossoms grows profusely. It is common to find it six feet high, and now and again one will see a clump of it with stalks fifteen and even twenty feet high. The Mexicans claim that it is not indigenous to this part of California but that it was brought here from Mexico.

The quelite is a large species of chenopodium, the seeds of which the Indians have long used in making a rude bread which is by no means unpalatable. In the days of early emigration to the gold country this plant formed the chief feed of the horses and cattle. The emigrants called it "careless weed" from an imperfect hearing or rendition of the Indian name. It would better be spelled kel-é-tey.

Of lichens alone the desert has a wonderful assortment, not, of course, in the actual sandy barren areas, but in the oases and on the mountain slopes. On the granite and other rocks, on the earth, among the mosses, on living pines and oaks, on dead

pine wood logs and branches, fertile in some places, barren in others close by, these modest and unobtrusive members of the plant family grow.

The trees of the desert are equally as interesting as the flowers. There is not a large variety, but each one has its own peculiar attractiveness. There are several trees that immediately attract the attention of newcomers to the desert, and that grow upon acquaintance. These are the honey-pod mesquite (the *Algarobia glandulosa* of Torrey, and the *Prosopis velutinea* of later botanists); the screw-bean mesquite (*Prosopis pubescens*), the smoke tree (*Dalea spinosa*), the desert willow (*Chilopsis saligna*), the small-leaved palo verde (*Parkinsonia microphylla*),

A group of old mesquites

and the creosote bush (*Larrea mexicana*). In various canyons as well as on the plain near Indio the fan-palm (*Neo-washingtonia filifera*) has its native and only habitat, this palm being now determined as a distinctively Colorado Desert species.

On the mountains are the nut-pines, *Pinus coulteri*, which produce the largest cone known. It abounds on Mount San Jacinto. Though the Saboba and Santa Rosa Indians do not eat the nuts it is said that other Indians do, but of this I am not sure. The pinion pine (*Pinus monophylla*), commonly known as the *Pinus edulis*, is found on many of the mountain slopes and is justly esteemed for the rich flavor of its nuts. The Mexican locust tree (*Robinia neo-mexicana*) is also found on the desert.

In several of the dry washes near the Chuckwalla range I

found specimens of the cat's claw (*Acacia greggii*, Gray) and it is seen occasionally as far west as Banning.

In some of the valleys the principal feature of vegetable growth is the ocatilla (*Fouquiera splendens*). This peculiar tree is a bunch of thorny sticks shooting up from a common center, each stick evidently trying to grow up straight but, being compelled to yield room to its fellows, finally compromising on a slight angle. Each stalk grows independently of all others and attains its own individual height. Some are very straight, others fall over almost like the graceful palm, and still others have sudden angles and strange twists. Sometimes the very tips, after the stem has grown up straight to a height of twelve, fifteen, and even eighteen feet, droop over with an air of dejection which seems to say the battle to keep straight is too hard. Occasionally they attain a height of twenty feet. I have counted one hundred and twenty stems on one ocatilla, though few have so many. The general appearance of the tree is as if a handful of straight-stemmed plants had been put into a vase, so that, while at the base the stems were kept all together, they had spread out, up above, in every direction. I found them in full flower at the end of March. The flower is a flaunting panicle of a brilliant scarlet, composed of beautiful bell-like blossoms. Sometimes, when looking toward the sun, the flower appears like a flaming plumaged paroquet or other brilliantly feathered bird resting on the end of the limb.

The mesquite

The ocatilla has the remarkable habit of leafing out after a rain. The leaves are a tender green and spring out along the

Photo. by George Wharton James

THE OCATILLA IN LEAF

stems, side by side with the thorns. Even though it be but a slight rain and only the stems (not the root) get wet, the leaves appear. Padre Junipero Serra, the founder of the California missions, had a very poor idea of this "candle cactus," as he called it. He said it was useless, even for fire-wood. Between Yuma and Pilot Knob there are quantities of them, as also at the upper end of Crawford Valley.

A noticeable peculiarity of such desert trees as the mesquite, palo verde, and desert willow is that they are seldom so tall as the same species elsewhere. This is owing to the intense heat, causing atrophy of the growing bud of the upright stem of the tree. This bud, being above the rest of the tree, necessarily receives the direct, full rays of the sun. Unless it is specially protected — as some of the desert plants are — it becomes scorched and either grows very slowly or dies and falls off. This compels the outforcing of lateral buds, an instinct of nature to protect the tree from destruction. These lateral buds grow with comparative profusion, consequently the tree gains in density and breadth what it loses in height. The result is that many desert trees have the appearance of being stunted or dwarfed in height, but are "stocky" and bulky below.

Ocatilla, or the Devil's chair

The mesquite is a fine illustration of this, for it is no uncommon thing in the Coachella Valley to find this tree with branches outspreading far and wide from the ground up. They appear as if some great weight had pressed them down, and like truth they had risen again, yet bearing in their aspect the proof of their having been forced down to the earth.

The desert palm, however, is not a "croucher" like the mesquite. It shoots bravely up into the fiercely heated atmosphere, for it loves its head in the fire. The young palms always have a

mantle of drooping dead leaves which clothes them to the ground. Thus the tender young stem is protected from the too fierce heat of the sun, and "the mold within the curtained area is kept cool and moist while all around is hard-baked soil. When the tap-root is deep down to water level, the sheath of thatch may be burned away as is done by the Indians" to render the fruit more easily gathered. The palm is an endogen, its core of life in the heart of the thick, dense mossy bole. So even after these fires the trees survive, the perfect harmony of their natural growth unaltered, their glorious crowns of vivid green still trustfully reaching up toward the sun that has destroyed every other sprout of tender verdure.

The screw mesquite is a more beautiful tree than the bean mesquite, its narrow outline and ascendant branches giving it a strikingly different appearance and much more graceful figure.

The screw-bean mesquite

Almost all old prospectors and desert dwellers contend that the coolest and most comfortable shade of the desert is that of the mesquite, though their explanations for that fact often vary greatly. Probably the reason is that the delicately divided leaves allow a perfect circulation of air which is cooled by passing over the countless cool surfaces of the leaves, at the same time keeping off the direct rays of the sun.

The mesquite leaves out after the rains, if there are any, or generally about the end of March. Its tender leaves are a sweet soft green that is peculiarly restful to the eye awearied with the long stretches of gray sand, alkali-crusted clays, and effloresced salt. In the summer the darker green is crowned and variegated here and there with patches of the parasitic mistletoe, which, however pernicious in its influence upon the tree, certainly has a picturesque effect upon its color, for its rich Vandyke brown with a tinge of reddish gray is most effective and agreeable.

The mistletoe (*Phoradendron*) is a common feature of desert trees, the parasite growing so abundantly as to almost hide the

leafage and growth of its host. Several varieties are found on the desert.

The bean mesquite and screw mesquite both flower from April to July, while the cat's claw or desert acacia (*Acacia greggii*) is a month later. The palo verde (*Parkinsonia torreyana*) generally blossoms in May, but I have seen it in full bloom as early as March.

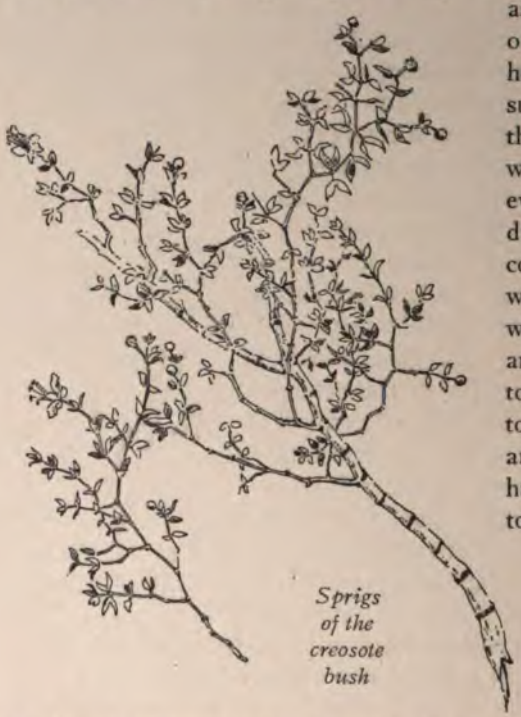
The mesquite, palo verde, ironwood and cottonwood do well under cultivation, the two former being especially desirable in this desert region. As a decorative and landscape tree there is nothing superior to the mesquite for desert regions. They are hardy in the most adverse conditions, and yet can stand a much larger supply of water than they ever receive in their natural condition. For wood they are both useful and necessary. During the past years the mesquite regions have been almost denuded of this valuable tree, and as far as I know not one single effort has been made to preserve it. If this course is long continued people on the desert will suffer as those elsewhere have done who have neglected proper and natural precautions to provide for a continuance of supply. The mesquite grows well from seed, needs little care, and in eight to ten years attains full size.

False tidytips
(*Leptosyne douglasii*)

Bee-keeping can profitably be carried on in the regions where mesquites abound. It is found that an ordinary sized tree, one, say, fifteen feet high and thirty feet in diameter, will contain as many as fifty thousand blossoms, which will give at least two and one-third pounds of honey. Mesquite honey is one of the best that finds its way into the market, being of pure white color, rich in sweetness, and of delicious flavor. In the excessive heat and dryness of the desert the honey products would speedily evaporate the surplus moisture and ripen, a natural process which enhances its keeping quality. It also increases the weight some two to four pounds per five-gallon can.

The arrow-weed, which is very common on the desert, is also found to be a good honey plant, making a rich amber-colored honey, which, while not equal to mesquite honey, is still most palatable and finds a ready market.

The flower of the palo verde is a soft, beautiful, alluring yellow. Every point becomes a flower, and each seems more charming than the other. Riding along in a deep-walled canyon, the mind as well as the body oppressed by the heat of the desert sun and the height of the enclosing walls, which are devoid of every vestige of verdure, you suddenly come upon a side wash or canyon where there is soil and moisture enough to give nourishment to this interesting and singular tree. It has blossomed from top to bottom and all around. It is a vision of loveliness all the more startling that it is so unexpected. Green and yellow, blended and blending in such soft, sweet shades, you cannot keep from the reflection that God must love beauty for its own and His own sake, for here is this desert glory wasting the sweetness of its beauty on the desert.



Sprigs of the creosote bush

The dalea spinosa is often called by the prospectors the smoke tree. It is seen nowhere else than on the desert. There are several varieties of dalea, but they are all desert habitants. Its leaves are a kind of spine, which, however, look like foliage at a

distance. With its gray limbs and delicate sage-green spiculæ it appears, when seen at a short distance, not unlike a filmy, wind-blown, smoke cloud, ascending from some strange and deserted camp-fire, with white streaks of sunlight darting through it. But beware how you allow its peculiar beauty to allure you to approach it too nearly and too carelessly. For if you do you will soon discover why it is also called by the miners and teamsters "the porcupine tree."

When flowering the dalea spinosa is a most gorgeous and glowing spectacle. Every point blossoms into flower, and every flower is a treasure of deep purple. Imagine a tree covered with fifty to a hundred thousand of these blossoms, bathed in the pure, luminous desert atmosphere, and made glowing and resplendent in the desert sun. It is a spectacle of royal purple that the eyes of man, unfamiliar with the desert, have never gazed upon, — a spectacle of color that would have dazzled the eyes of those used to the royal purple of the great Solomon when he and his spouse ascended the throne, aye, even had he and his whole court been robed in the transcendent richness of the Tyrian purple.

Sunshine
(*Baeria gracilos*)

Greasewood of many kinds (*Atriplex*) is found on the desert. Like the creosote bush it is ubiquitous. Though at first it looks "bloodless" and uninteresting, it becomes vested with its own charm when one understands its difficulties, its habits of growth, and its desert triumphs.

It is one of the atriplexes — the black salt-bush — that the Indians of Martinez use for coloring the splints of their basketry black. Their name for it is *gnah-yil*. They boil the plant and squeeze out the juice, and in the liquor, in which they allow the stalks to remain mixed with ashes, they soak their splints for about a week. The black is not as deep and perfect as the natural black of the martynia, but it is effective and permanent.

The white salt-bush is very common in various parts of the desert, and in Mesquite Land grows to a great height. I have seen in-

dividual bushes fully twenty feet high. In Santa Barbara this beautiful plant is cultivated for hedges. Trimmed and pruned, it looks far better than most hedge growths, and it adds quite a novel factor of beauty to that always beautiful town of the Virgin Saint. This is not exactly the same species as that found on the desert, but it appears very similar, and is a "beach" sister of its desert brother.

Some kinds of greasewood and palo verde are used by animals as "browse" when other forage is short. Looking at them, the uninformed observer would declare that there can be no nutrition in them, yet analysis shows that they are rich in protein, fats, and carbohydrates. Indeed, some greasewoods are said to contain more protein than alfalfa.

Queen of the night cactus

The creosote bush (*Larrea tridenta*) is one of the commonest of the desert plants. It is singular how different people regard it. By some it is liked both in appearance and odor, and others disparage it in every way. Dr. Asa Gray says it is "so vile in odor that even mules will not eat it," and I think to most people it is objectionable. But Fremont says: "Its leaves are small, covered with a resinous substance; and, particularly when bruised and crushed, exhale a singular but very agreeable and refreshing odor." Mr. Eytel agrees with Dr. Gray, while I find the odor affects me as it did Fremont. Its leaves are of rich olive-green, and its flowers are a delicate yellow, coming out of a green calyx, and with separate seed-pods tufted like a tiny bunch of cotton. It grows as high as ten and fifteen feet, though its average is perhaps not more than eight or nine feet, and in form, in pliancy of its branches, in the richness of its color, in the shape of its leaves, as well as in its yellow flowers and white cottony tufts, it constitutes a singularly graceful bush. Indeed, to me, there are few of our garden shrubs that surpass it in general effect.

The desert willow (*Chilopsis seligna*) has somewhat the appearance of the catalpa. It flowers beautifully after the winter rains, a delicate white, with purple and pink tintings of color in a bell-like blossom. It is fairly abundant in the canyons on the northeast of the Salton Basin.

While to the ordinary eye there are not many varieties of cactus, it is possible that the scientists have discovered in the American Southwest pretty well on to a thousand different species.

I once asked an old Colorado Desert prospector how many varieties of cactus he was familiar with. "By gosh," said he, "you city fellers have no idea how many kinds we got. I know every one of 'em. There's the 'full of stickers,' 'all stickers,' 'never-fail stickers,' 'stick everybody,' 'the stick and stay in,' 'the sharp stickers,' 'the extra sharp stickers,' 'big stickers,' 'little stickers,' 'big and little stickers,' 'stick while you sleep,' 'stick while you wait,' 'stick 'em alive,' 'stick 'em dead,' 'stick unexpectedly,' 'stick anyhow,' 'stick through leather,' 'stick through anything,' 'the stick in and never come out,' 'the stick and fester cactus,' 'the cat's claws cactus,' 'the barbed fish-hook cactus,' 'the rattlesnake's fang cactus,' 'the stick seven ways at once cactus,' 'the impartial sticker,' 'the democratic sticker,' 'the deep sticker,' and a few others."

I am not scientist enough to pass judgment upon the accuracy of the old prospector's classification, but to my layman-like mind he seems to have been pretty successful in his endeavors to tabulate them all.

It is interesting to note that different species of cactus are found on both sides of the mountain ranges that separate the desert from the coast. The species are much alike, yet clearly distinct, and are not known to cross the range. This applies to the echinocactus, the opuntia, the mamillaria, and the cereus.

Dr. Veatch, who was one of the earliest of scientists to visit the mud volcanoes of the desert, had quite an experience among the cactuses, as he journeyed over the San Felipe Pass. His horse became irritated or frightened and began to plunge, so he threw himself off, and in the struggle that ensued, as the horse tried to get away, the doctor was dragged and shoved alternately amongst opuntias higher than his head, until his clothes, to use

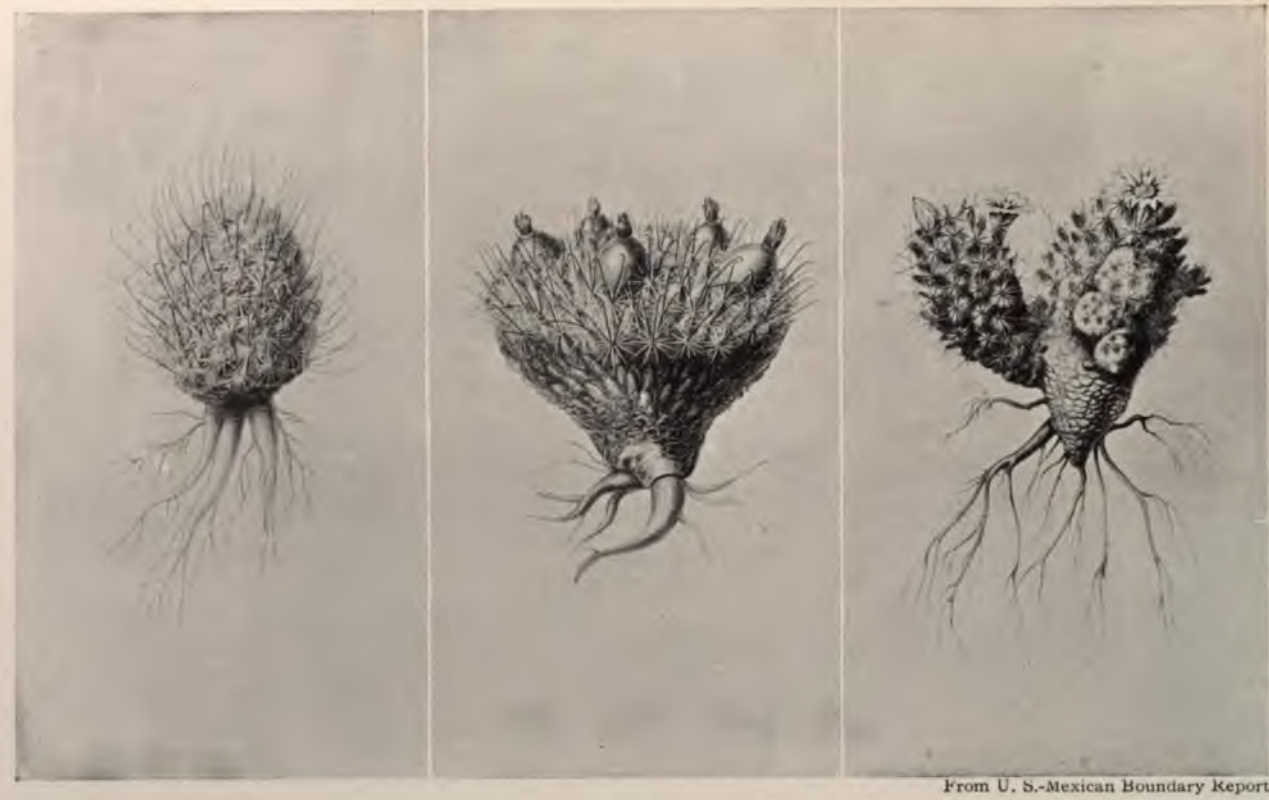
his own expression, "were literally pinned to the flesh from head to foot by the barbed needle-like prickles."

Cactuses thrive on the desert as if specially guarded. Here are the tiny mamillaria in several varieties, though one has to hunt for them. But how well such a hunt is repaid! Small, armored, armed balls, they have tufts of flowers of super-earthly beauty and of tints and colors not surpassed by any flowers of earth. I have found the *Mamillaria echinus*, with its plum-like buds out of which the dainty flowerets burst; the *M. macromeris*, with its long spines and floral crown of feather-like petals; the bunchy *M. radiosa*, with its starlike clusters of spines and its lanceolate petals; the *M. phellosperma* and *M. grahami* and several other species.

Pentachaeta aurea

The *Mamillaria grahami* is a most beautiful specimen of a desert plant. It grows not far from the Colorado River. Each bunch of spines has one, two, or three central spines, the chief one of which is generally hooked at the end. The flower is an exquisite and dainty blossom of a tender rose color. It was named for Colonel Graham of the U. S. Corps of Topographical Engineers whose unfortunate quarrel with Bartlett led to his withdrawal from the work of the Mexican Boundary Commission.

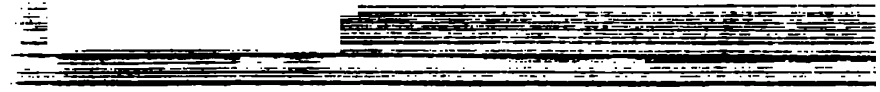
Here, too, are the opuntias, especially the *O. basilaris* with its look of velvety softness. But beware how you touch it. In a moment a million (more or less) of microscopic thorns have pierced your flesh, and sometimes they do not come out until after they have festered. One sees also with delight a number of *echinocactus*, and is charmed into excited runnings to and fro as new and more beautiful specimens in flower appear. There are scores of the most conspicuous of the species, the glorious *E. lecontei*, named after the former president of the State University of California, who discovered it. It is the well-known "barrel cactus," so useful to travelers on the Colorado Desert, and I have found it in the tributary canyons of the Grand Canyon,



From U. S.-Mexican Boundary Report

Mamillaria Grahami *Mamillaria Wrightii* *Mamillaria Pusilla var. Texana*

SPECIMENS OF CACTUSES



in Northern Arizona. It is also found in Lower California below the mouth of the Colorado River. The Mexicans call it "bisnagna," and they and the Indians often use its water storage when traveling across the desert. The mode of obtaining the water, which, of course, is the juicy pulp of the plant, is very simple if one has an axe, hatchet, or large hunting-knife. Cutting off the top of the barrel, the pulp inside is crushed with a stick or the axe-handle, thus releasing from the cells of the inner tissue the copious flow of juice therein stored. The tough and water-tight coating of the plant makes a perfect reservoir, and I have known one cactus yield nearly four pints of the refreshing liquid. It is slightly acid in taste, but relieves thirst admirably.

Tidy-tips (Laya platyglossa)

Some of the opuntias are beautiful in the extreme. They have a color, shading from light sage-green to ebony-yellow,—tones to make a connoisseur rave with delight. As the sun shines on this mass of ivory spines they become a halo, more exquisitely beautiful than any ever painted over sainted figure by enraptured artist. In shape their shiny limbs are almost like bunches of bananas turned upward. When the spines fall off, as they do each year, they look like small bunches of porcupine quills, long, sharp, and penetrating, and the slightest breeze blows them toward you. This has given rise to the popular superstition that they are attracted by the human presence and come to you in obedience to this weird influence.

The lizard, however, has no fear of the thorns. He runs in and out, under and over them, apparently without a thought, while to the unsuspecting human animal, let him but approach near enough, they seem to reach out and pierce him to the quick.

In Arizona some of the commoner forms of cactus have been singed and used as forage plants. The season of 1903–4 was one of great drought. Cattle suffered on the ranges for want of feed. Stockmen were at their wits' end to know what to do for

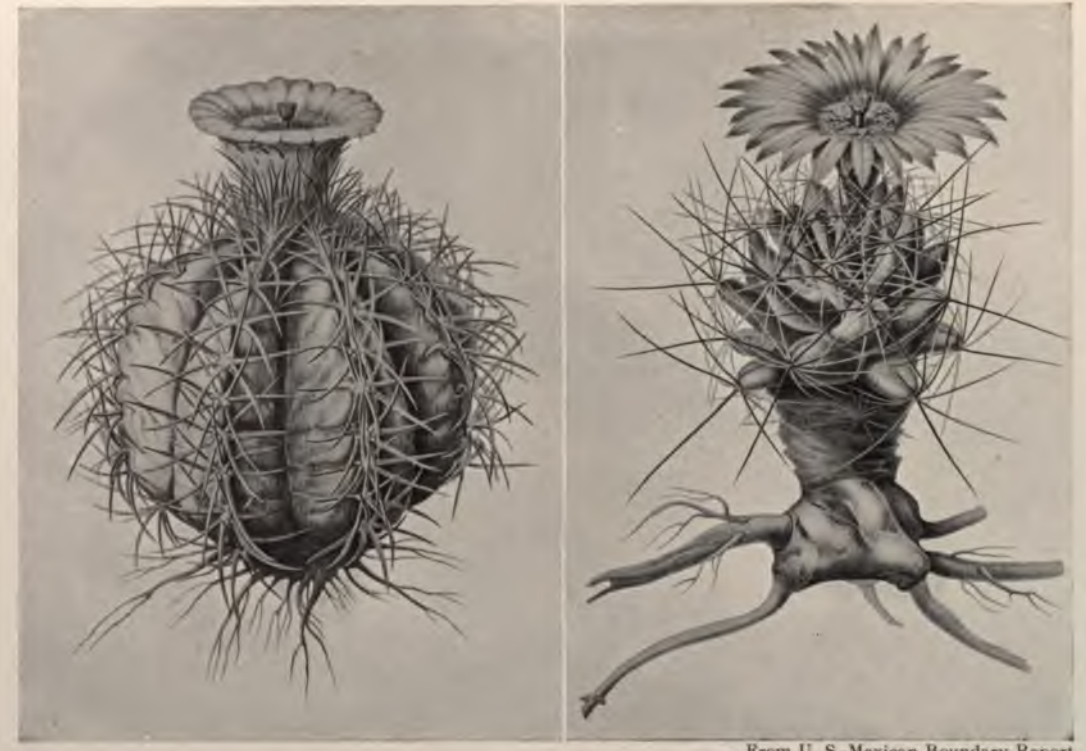
their cattle, which, half starved, were wandering away from the ranges in search of food, and wearied and unsuccessful were dying by scores. The Experimental Farm tested the matter, and analyzed the nutriment values of certain cactuses. A gasoline burner was designed, on the principle of the familiar plumber's gasoline torch, and it was found that on the desert from seven thousand to eleven thousand pounds of cactus forage could be singed each day. Hungry cattle ate it with avidity, literally devouring every particle of the prickly pears and leaving only the trunks and woody branches of the chollas. The cactus is valuable to cattle not only because of its nutritive qualities, but even more so because it contains so much water, fully seventy-five to eighty per cent being moisture.

But Luther Burbank, the wizard of plant life, has solved the spine problem without singeing. He has developed a species of spineless cactus which has high nutritive and water value. This cactus will undoubtedly, in time, be planted in large areas of the Colorado and other deserts and thus aid cattle, if not man, in solving that most difficult of desert problems, — the permanent and well-distributed supply of water in the dryest areas.[1]

The many contrivances of nature in the desert to aid tree and plant life in the struggle for existence against the great heat and the scarcity of water make a most fascinating branch of study. How comes it that delicate plants and flowers are able to bear the heat? What are the special adaptations of plant life in the desert? This subject has been most carefully studied and thoroughly presented by Frederick Vernon Coville in his "Botany of Death Valley," and what follows is based upon his remarks.

On the desert as elsewhere the customary methods of pollination appear to be sufficient. Insects in their hunts for food carry the pollen and distribute it where needed. The wind also does its share.

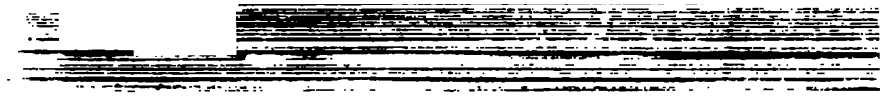
[1] Since the above was written I have seen the spineless cactus of Mr. Burbank, have rubbed my hands and cheeks all over it. It is a marvel. But the suggestion that this cactus will soon be planted on the desert needs qualification. If planted in the open it is so attractive as an article of food to all animals, wild and tame, that it would soon disappear. It will need to be planted in a protected area, and then fed to stock, as are corn, beets, etc.



From U. S.-Mexican Boundary Report

Echinocactus Horizonthalonius *Mamillaria Macromeris*

SPECIMENS OF CACTUSES



There is wide adaptation and variety of methods in disseminating the seeds. The "downy" seeds of many compositæ, such as *Aster mohavensis*, *Tetradymia spinosa*, etc., are easily wind-borne; the fruits of the *Larrea* and *Eurotia* by the long divergent hairs on their surfaces; those of the *Atriplex*, *Grayia*, and *Sarcobatus* by the plate-like enlargement of the involucre; and those of the *Salazaria* by a bladdery inflated calyx. While in none of these cases is the fruit buoyant enough to remain suspended in the air, it is sufficiently light to be blown along the surface of the ground by an ordinary wind. In other plants the stem breaks off as a base and the whole plant goes rolling over and over as a tumbleweed to scatter its own seeds. Other seeds have barbed bristles that catch in the fur of desert animals and are thus transmitted. The fruits of the *Opuntia* are all dry (though fleshy away from the desert), and are thus able to be carried by the wind.

Blue-and-white lupin (*Lupinus bicolor*)

The chief problem of desert plant life is that of ordinary growth. There is sufficiency of light and food, but moisture, both in the air and the soil, is deficient. "A plant absorbs moisture from the soil through its roots, carries it along its stem, and transpires it by evaporation from the stomata (breathing pores) of the leaves. Transpiration is an absolute necessity in the growth of a plant, for upon it depends directly the performance of several of the vital functions. If a plant of ordinary structure, such, for example, as red clover, were exposed to the climatic conditions of the desert, it would wilt, dry up, and die. To speak in physiological terms, the hot, dry air has caused more water to be transpired from the leaves than the roots can supply, the soft tissues have lost their turgescence, and the dependent vital functions have ceased. The first theoretical necessity of the plant is that the water it ab-

sorbs from the ground shall practically equal in amount that which it transpires. Desert shrubs accomplish this by the reduction of transpiration and by the increase of means for absorption."

I have already referred to the great roots of some desert plants. The mesquite roots extend enormously and can often be found fifty, sixty or more feet away. Yet "during the season of drought the largest amount of moisture that the roots can by any possibility absorb is comparatively small, and the greatest burden of modification must fall on the transpiratory system." A careful examination of many desert species led to the following conclusions. The leaves of desert plants are strikingly modified in size, form, and thickness. As a rule they are small, only six out of forty-one shrubs examined having leaves with a single surface area which exceeds one square centimeter (about half a square inch). There is no limit to the smallness of the leaves, for the *Cereus* and *Echinocactus* have no leaves at all, and in the *Ephedra* they are represented by scales devoid of chlorophyll and so constructed as to preclude the possibility of transpiration. In such cases all the transpiration is carried on by stem.

The creosote bush

In this connection it is interesting to note the peculiar leafing habits of the ocatilla (*Fouqueria splendens*). As I have elsewhere said, this "candle cactus" will lose all its leaves in hot, dry weather. At such times it transpires through the stem. On the first rain, even though the roots are barely wet, the plant immediately leaves out, undoubtedly for the purpose of affording it the opportunity for a period of leaf transpiration. Able to do without leaves when it has to, it leaps to avail itself of them at the first possible advantage.

The *form* and *thickness* of the leaves of desert shrubs are direct modifications for reducing the evaporating surface. It is surprising to the superficial observer to find the peculiar forms of

these leaves; all of them clearly adapted to resist rapid evaporation; and in all the forty-one specimens examined not one had a thin leaf.

Then, too, the early falling of the leaves of desert shrubs that have none of the special adaptations for preventing rapid evaporation, such as hairy, scaly, or resinous epidermis, is a special provision for their protection. The leaves grow rapidly during the spring rains and carry on most rapid transpiration, but when the intense heat comes they are unable to continue, and not being able to adapt themselves to a slower transpiration they dry up and fall away. In some plants the means for transpiration is in the epidermis of the stem, which is well supplied with chlorophyll to permit the assimilation of food.

Blue larkspur (Delphinium)

"In the majority of plants, however, the leaves remain on the stems during the greater part of the summer, carrying on their functions. To confine transpiration to that minimum which alone it is possible for a plant in such environment to support, the surfaces of the leaves are protected either by a resinous exudate or by a close covering of dry hairs.

"In *Larrea tridentata* (the creosote bush) is found the apparently simplest form of resinous coating. The leaves and small twigs are thinly spread with a covering that closely resembles in appearance ordinary shellac. To the abundance of this resinous matter the plant's popular name, creosote bush, is due, for in burning the green wood and leaves of Larrea a pungent odor is detected, and a dense smoke arises. That the function of the coating is to minimize transpiration, there can be no doubt, but the precise method by which this is brought about has not been ascertained. If it were simply by the complete mechanical varnishing of the leaf-surface, all transpiration would cease. It

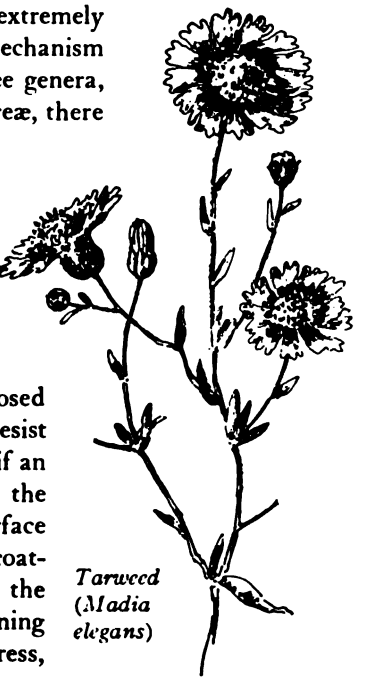
should be pointed out here that in winter, when we first became familiar with the creosote bush, its leaves were thoroughly varnished; but in June, when the spring growth had nearly ceased, the leaves appeared to have very little of the coating. There is in this fact an evident correlation between rapid transpiration and absence of resinous covering, and a similar correlation between slow transpiration and the presence of such a covering."

Resinous exudate, when it occurs on desert plants, is usually definitely associated with conspicuous glands. Some of these glands are on the surface of the epidermis or partly imbedded in the tissue. In some species the glands are confined almost entirely to the stem and branches, and are found only very sparingly on the leaves. In other species the glands are confined to the leaves. "These two types of the distribution of glands are seen at once to be correlated with the functions of stem and leaf. Plants which rely principally upon their leaves for transpiration have these organs more glandular than their stems, while plants in which the leaves drop off early, and which, therefore, are forced to transpire from their stems, have precisely the opposite provision." In some of these species the contents of the glands do not exude over the surface of the adjacent tissues, and therefore only a portion of the surface is protected by the exudation. This fact suggests strongly the idea that in such cases some other function than the mere mechanical sheltering of the transpiration surface must be ascribed to these glands. The elucidation of the problem is likely to be attained only by direct experiment.

Fourteen of the forty-one shrubs examined by Mr. Coville have a conspicuously developed hairy coating of the leaves or stems. These hairs are varied and individualistic, and the why of this is not yet fully understood. "The general important fact, however, is that from almost any form of trichome there may be developed, under a desert environment, a close hairy covering, so constructed as to greatly reduce the amount of heat transmitted from the air to the plant. In general the individual hairs of such a covering have no moist cell-contents, but are minute sacks or tubes of cellulose filled with air and closely felted together. The air contained in the cavities of the hairs and in the spaces between them constitutes an excellent non-conductor of heat. It is un-

doubtedly true also that the circulation of air through the interstices between the hairs is comparatively sluggish, and the extremely dry atmosphere is therefore admitted very slowly to the stomata and through them to the moist interior of the leaf."

"A few genera of desert plants, *Ephedra*, *Cereus*, and *Echinocactus*, carry on transpiration through their stems only, and are protected by neither glands, resinous exudate, nor hairy covering. In Ephedra transpiration is reduced undoubtedly by a thickened and extremely impervious cuticle, aided by the mechanism of the stomata. In the other three genera, all belonging to the order cactaceæ, there is likewise a marked thickening of the cuticle, together with a special modification of the interior tissues of the stem to retain water. If a leaf or stem of any plant not containing these water reservoirs be split, the organ is speedily desiccated, since the soft tissues exposed by cutting are not adapted to resist the drying effect of the air. But if an Echinocactus stem be cut open, the outer layers of cells on the raw surface become dry and form an artificial coating. With this slight protection the interior tissues are capable of retaining their moisture, even in the plant press, for several weeks."

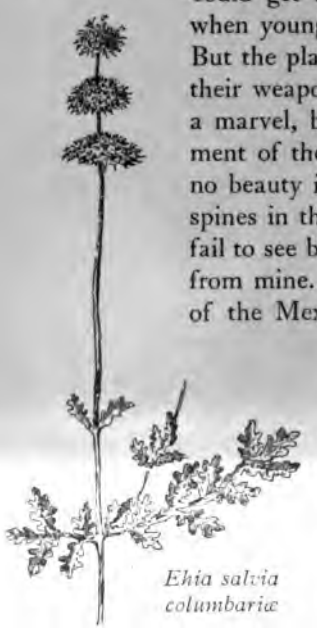


Tarweed (Madia elegans)

The vast importance and interest of this phase of the subject is my only excuse for making such lengthy extracts from Mr. Coville's interesting and lucid paper. He suggests many other phases of the subject that are yet in the process of elucidation, and to these suggestions those who are interested to go further are respectfully referred.

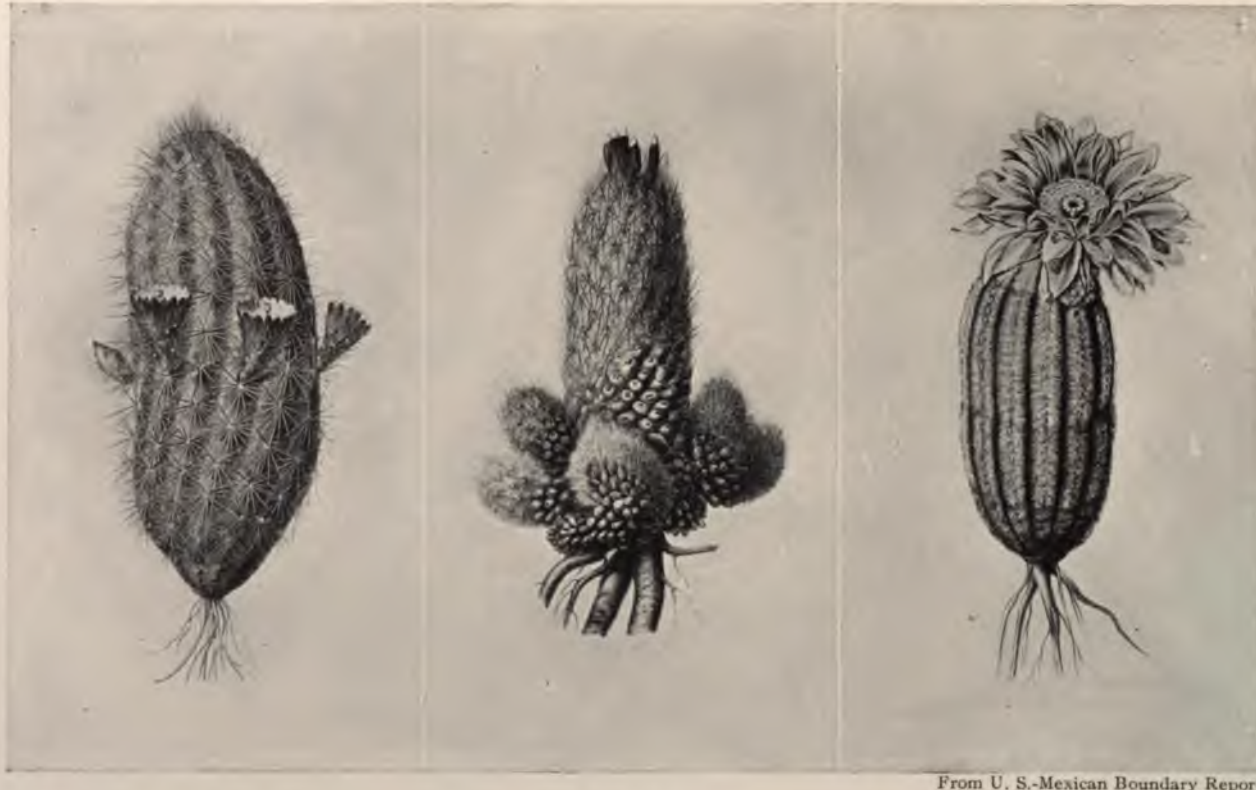
Another provision for the protection of desert plants is the fierce thorns with which they are garnished. Like the knights of

old, they sleep in their armor, which covers them from head to foot. And what armor it is! The thick and impenetrable epidermis is covered with thorns sharper than any needle and far more tough and strong. The various cactuses present a perfect arsenal of weapons to you, and bid you begone. But it is not as defense against man that they are thus panoplied. The desert animals are great "stayers" without water, and if they could get at these succulent plants, especially when young, they would find life an easy thing. But the plants fight hard for life, and these are their weapons. The thorns of the cactuses are a marvel, both in form and variety of arrangement of their stars. Let those who say there is no beauty in them look at the starry clusters of spines in the accompanying pictures, and if he fail to see beauty his eyes register very differently from mine. From the report of the scientists of the Mexican Boundary Commission I have taken these exquisite engravings, and several of them have been reproduced for this work, to give a true conception of the wondrous beauty of even the defensive weapons of these little known and seldom seen desert plants. Who can look, for instance, on the *Mamillaria pusilla*, with its dainty arrangement of these formidable spines, and not see wondrous beauty? And, in fact, every one of these plates is worthy a careful study from the esthetic standpoint alone. It will be noticed that some of the starry spine clusters have one, some two, some three central spines, one of which is generally hooked. These central spines give surer protection, for no animal can worm his way into the heart of any plant thus armored. Some of the spines are long, some short, some hooked, some are barbed, and some are so sheathed that when the thorn penetrates part of the sheath remains in the wound and festers.



Ehia salvia columbariæ

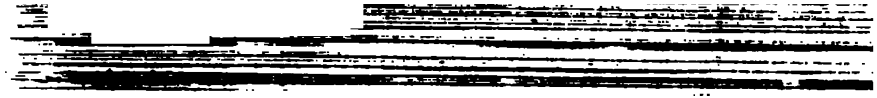
The spines of the *Echinocactus* add a color value also to their



From U. S.-Mexican Boundary Report

Cereus Chloranthus *Mamillaria Tuberculosa* *Cereus Cæspitosus*

SPECIMENS OF CACTUSES



general beauty. They are ivory-like, with streaks of delicate pink throughout and across them. Compare the star clusters of the *Echinocactus horizonthalonius* with those of the *E. intertextus*. How different, yet how perfect in arrangement and how beautiful! Then in the *Cereus viridiflorus* an entirely different but equally classic and exquisite arrangement is given. When I see the labored efforts of the commercial designers, and think of the wealth freely offered by Nature in these desert suggestions, in cactus, lizard, snake, and animals, I am amazed at the ignorance and stupidity of those who prefer to work over old and insane conventional designs instead of striking out boldly by giving to the world these original conceptions of Nature.

As to the flowers of the various cactuses, there is nothing in the floral world, to my mind, that can equal them in fineness of texture, loveliness of color, and perfect grace.

Evolution of Indian dwellings

CHAPTER XV

The Indians of the Desert

OME white men are naturally antagonistic to the desert. They fear, dread, and shun it. Its hardships and dangers, its perils and deaths, daunt and restrain them, and comparatively few ever venture into its secret and hidden places.

The Indians have no such dread. They do not complain of the desert's hardships. They have no fear of its perils. While they regard some things on the desert with veneration and awe, such as the rumblings heard near Tauquitch Peak, on Mount San Jacinto, and the noises caused by the wind in the rocks on Mount Palomar, they are familiar with everything on the desert at all times. It is their home, chosen for them by the gods, where they are bound to reside until their supreme guides lead them elsewhere. For the Indian is nothing if not reverent. His reverence may to us seem to be superstition, yet, all the same, it is real and sincere to him.

It will be impossible to devote as much space to a consideration of the desert tribes of Indians as I desire. I must leave the subject for fuller presentation in books which I have in contemplation.[1]

Below the Grand Canyon there are several tribes of Indians who live on the Colorado River. These are the Mohaves on the Fort Mohave reservation, and then a band of Chemehuevis, the latter being renegade Paiutis who found a home here many years ago when there was a famine in their own habitat. Below the Chemehuevis is another group of Mohaves, on the Colorado River reservation. Near Yuma are the Indians who gave the name to the city, and nearer to the gulf are the Cocopahs.

[1] These are in preparation. One will deal with the Indians in the Mount San Jacinto region and will be entitled "The Indians of Ramona's Country;" and the other will fully discuss the Indians of the Colorado River.

In the hot weather it is no unusual sight in the more secluded parts of the river to find a group of Yumas sitting in the mud with fresh mud on their heads, and one writer facetiously remarks that "by dint of constant dipping and sprinkling they manage to keep from roasting, though they usually come out parboiled. Strangers coming suddenly upon a group squatted in water up to their necks, with their mud-covered heads glistening in the sun, frequently mistake them for seals. Their usual mode of traveling down the river is astride of a log, — their heads only being visible. It is enough to make a man stare with amazement to see a group of mud-balls floating on the current, laughing and talking to each other as if it were the finest fun in the world. I have never tried this mode of locomotion, but I have an idea it must be delightful in such a glowing summer climate."

"Salesladies"

There are a few Cocopahs who now reside near Calexico, and until recently a village of the Dieguienos at San Felipe.

Indian dogs

The chief group, however, is of the Coahuilla tribe on the western side of the Coachella Valley, as far north as the San Gorgonio Pass, where, a few miles below Banning, the Potrero Village is located. Here are two hundred and twenty-five Coahuillas and Serranos — the latter being the mountain tribes, who have considerably intermarried. At Palm Springs (to the white settlement of which I have devoted a whole chapter) are twenty-nine Indians on three thousand

eight hundred and forty-four acres. Water, however, is scarce, and without water the desert land is useless.

Recently an inspector of the Indian department visited Palm Springs and proceeded forthwith to file upon all the unappropriated water of the region. When asked if he intended to take all the water his reply was characteristic: "I'm here for one purpose, and that is to look after the interests of the Indians. They are poor, downtrodden, and incapable of caring for themselves. I'll do all I can for them. The whites must look out for themselves."

Cocopah Indians, near Calexico

At Cabazon on six hundred and forty acres are twenty-eight Indians. They have no water and their land produces nothing, and were it not for the mountain plants and seeds found on the foot-hills of the San Bernardino these poor wretches would die of starvation.

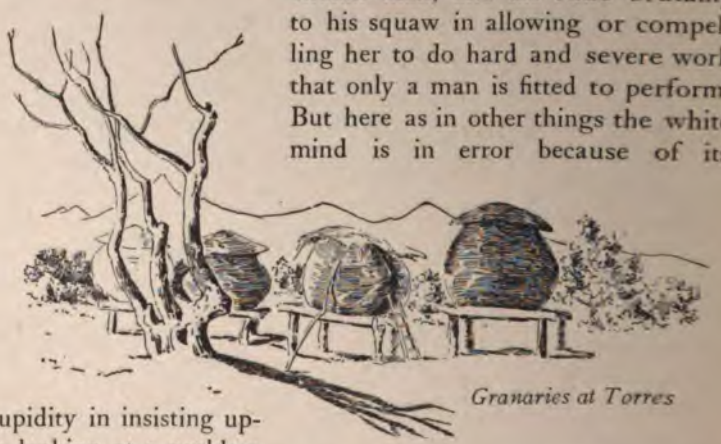
Below Indio are Torres, Martinez, Alamo Bonita, and Agua Dulce, all on the Torres reservation of 19,200 acres and with a population, all told, of 213. A reservation eleven miles long and varying in width from one to four miles, with plenty of water and exceedingly rich soil, is looked upon with envious eyes by not a few white men in Southern California. But let us

hope there will be no chicanery in dealing with this small remnant of a once powerful people. This reservation should be kept for them so long as there is a family to require it.

For many years the only water the Indians had was gained from surface wells they themselves had dug.

Potrero Indian reservation at Banning

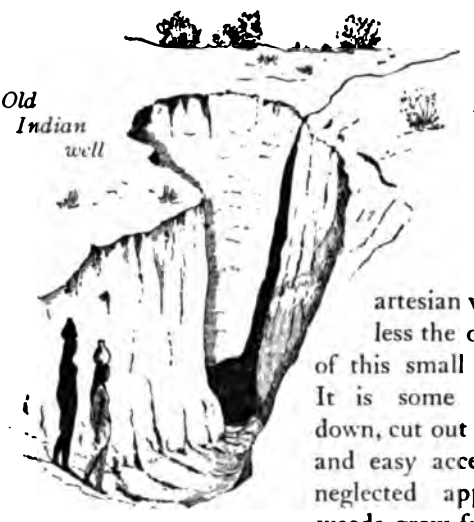
The earth was taken away from these excavations by the Indian women in baskets. They were, in the main, the excavators. To the white mind this is but another proof of the laziness of the Indian man, and his rude brutality to his squaw in allowing or compelling her to do hard and severe work that only a man is fitted to perform. But here as in other things the white mind is in error because of its stupidity in insisting upon looking at a problem concerning other people from its own angle of vision. The Indian woman laughs at the folly of the white reasoner. She says in explanation: "There are two kinds of labor, — man's and woman's. Man's labor is to hunt, to provide the food, and to fight, to protect the home. Woman's is to do all the work



Granaries at Torres

of the home. To provide water is woman's work. What though it means hard labor to get the water, Indian women are well and strong, and thankful to be well and strong. Those above give them strength and health. Do not white women want to be healthy and strong and capable of doing hard work? We do! We are grateful for our health and our strength. We like to use our strength, and we do not want our men to interfere in work that belongs to us and not to them."

Thus our pity is wasted, — bestowed upon those who scorn it, and whose scorn also is not undeserved when applied to those who would prefer to be dainty in appearance and "look nice," rather than be healthy, strong, vigorous, and capable of hard toil.



Old Indian well

But now the old Indian well is deserted. The labor of the past is forgotten. The new artesian wells have rendered useless the once priceless possession of this small pool of surface water. It is some fifteen or twenty feet down, cut out at one side to allow free and easy access, and now it has a neglected appearance. Brush and weeds grow freely around it, and the water that accumulates has a yellow appearance and is somewhat brackish to the taste, so that even the wild animals despise and forsake it.

This is not surprising when it is remembered that there are now ten artesian wells on the reservation. It is generally supposed that the first artesian well in the Coachella Valley was the one bored by the government on this reservation. This is an error. The Southern Pacific Company had first demonstrated the existence of artesian water at Mortmere and then at Mecca, after which the government set apart $2,500 for a well at Mar-

tinez. The expenditure of this sum is an example and evidence that the days of the unscrupulous politician are not gone by. Less than half, even a third, of this money would have secured the well, but the appropriation was all exhausted. Thus are the Indians robbed by scoundrel whites who are supposed to conserve their interests. The chief good, however, was attained. The securing of artesian water assured the material prosperity of these Indians, for with thrift and industry they can become more independent than many whites in less favored regions.

While all the villages of this reservation are of the same tribe, their inhabitants have not always been friendly one with another. Stories are rife among them that show that fights were not uncommon. The usual jealousies sprang up. Men of different villages went hunting in the same place at the same time and the women would go to gather wild seeds and find women from one of the other villages there ahead of them. These things engendered strife and quarrelings, and occasional slayings were not uncommon.

Indian boy on horseback

In various parts of the desert, scattered under clusters of mesquites, are numbers of pieces of broken pottery. Careful examination shows the major portion of these to have been large ollas. There was no evidence of any other than temporary habitation and no apparent reason for this. These locations were not on the line of any Indian travel to be used as camping places, and certainly no reason could be found for choosing such stopping places even if they were on any trail. For a long time I was puzzled to account for these places, until at last I was informed that they were used by Indians of the Yuma and Cocopah tribes, who, long ago, occasionally made raids on the mountain tribes. Their squaws accompanied them, and, as these raids were generally made in the hottest seasons of the year, the large ollas were filled with water. The squaws then

settled themselves down under the chosen location of mesquite, keeping the ollas filled, while the warriors went on ahead and perpetrated their designs of murder, rapine, theft, and destruction. Then, rapidly retreating to these spots, they rested awhile, knowing full well that the mountain tribes would hesitate at following them into the desert at such a heated time. Thus the crafty and heat-resisting Indians of one tribe preyed upon the fear of another tribe and their known dread of venturing upon certain parts of the desert in very hot weather.

In the remaining portion of this chapter I shall confine myself to the village of Martinez.

The only native officials are a *capitan* and *alcalde* — a captain and a judge. These the Indians are allowed to elect themselves, subject, however, to the veto of the Indian agent. Generally the election takes place in June, and the officer elected serves for one year. The capitan for this year is Poncho Lomas, and the alcalde is Francisco Nombre. It may be interesting to note that Francisco has four generations of married children living, so that he certainly cannot be accused of failing in his duty to replenish the earth. Captain Poncho informs me that the original name of his people was *E-vā-āt*, which signifies *people*. They came into the desert from over the San Jacinto Mountains, though originally, "in the beginning," as he put it, they came from the East. They were traveling many days, and all he knows of the journey is that his people were naked and had little to eat, having to subsist on pinion nuts, prickly pear, and wild grass seeds, with the few animals they could snare.

A Coahuilla basket

Those who settled in this spot found the surface water which led to the digging of the well, and there were many mesquite and other good things to eat that grew profusely. The mountains were close by where there was an abundance of game, so they settled here and were content.

Then the waters rose on the desert and drove them forth, and they ascended Martinez Canyon, toward the village of Santa Rosa, and lived there for many years, catching fish from the inland sea. The water remained for many, many years, and it was during this time that they made the so-called fish traps found on the level of the ancient lake beach. These traps are rudely circular in shape, and are simple depressions, surrounded by a wall of granite. They are from two and a half to nine feet in diameter, and give the impression that they were built out at low tide, so that as the water came in fish would enter and be caught. They may, says Major Rust, have been pens for holding fish that the Indians had caught. Then the water receded and the Indians slowly came down from the mountains and took up their residence again in the valley.

Indian pony

When the water first went down the land had very little on it, only a few grasses, and the people did not have much to eat. Then the grasses grew more plentifully, and soon the prickly pear and the mesquite came and then all was well. Those were the prosperous days. Every one had plenty to eat, they got fat and grew fast. "Ah," said Poncho, "when people have little to eat and they are small and thin, they grow slow. It takes a boy with little to eat long years before he becomes a man, but when he can eat much he becomes a man pretty quick."

Poncho's son Augustin is a farmer of no mean order. He has seven acres of barley, half an acre of onions, and three or four acres of cantaloupes as well as a good stand of alfalfa for feeding his horses. Besides attending to these horticultural and agricultural operations he is the chief partner in a hay-baling machine which the white men of Coachella Valley keep busy during the baling season. He is also a shipper of wood to the city markets. He engages the men of his tribe to cut mesquite wood and deliver it to him at the railroad for a certain price, on a given date. At that time he has a car there ready for loading, into which the wood is directly placed from the wagons, so that it is immediately ready for shipment. In addition to these sources of in-

come he is the interpreter of the little mission church, and he has learned the art of barbering.

The population of Martinez is 320, men, women, and children. The men are generally well employed, attending to their own well-cultivated and fairly prosperous farms. When their own work permits they go out and work at various occupations in the valley. Some are farmers, others prune trees, — and at this they are skilful, — pick fruit, pack fruit, some are machinists, and not a few work on the railway as section hands.

Land is held in community. All members of the tribe, male or female, who wish to use land may make application for it. A council is then held, and the land apportioned according to the judgment of those concerned, and the agent then confirms or alters the apportionment according to his own judgment. The amount of land on the reservation would allow each Indian to have sixty-two and one-half acres, but for some reason or other the agent restricts the allotment to ten acres.

Indian horse

The Indians now have very little stock (about two hundred and fifty head in all), and what they have is kept in fenced fields. When it was allowed to run wild there was constant friction between the Indians and the few whites who had located in the desert. The latter contended that the horses and cattle of the Indians ate and trampled down their grain, destroyed their gardens, ruined their irrigation ditches, and they would impound the offending animals and refuse to release them until they had been paid the sometimes unreasonable and unjust claims they made for damages. It can be well imagined what confusion and irritation arose from this course of procedure. As white men came into the valley in large numbers, the Indians seemed to realize that discretion was the better part of valor. With the best grace they could they submitted to the inevitable, sold the major portion of their stock, fenced their lands, and thus kept up the balance, so that there is little annoyance on either side in this regard.

At one time they had over one thousand burros, but few are now left. The way they were defrauded of their burros is another evidence of the superiority (!) of the white man. During one of the spasmodic mining excitements that now and again thrill Southern California, a few "clever fellows" bethought themselves of the burros of the Coachella Valley Indians. They were in great demand, for a prospector without a burro is as unthinkable as Othello without Iago or Desdemona. These rare specimens of the "superior race" built a pound or corral not far from Martinez, and then coolly proceeded to capture all the burros they could find, running wild over the desert or in the near-by canyons. They succeeded in capturing several hundreds which they then drove off and sold to the would-be discoverers of gold mines, in Los Angeles, Riverside, Redlands, and San Bernardino. Thus again was the superiority of the whites over the reds demonstrated, for the former got the burros and also the money for their sale.

Indian burro

A stout, well-built Indian named Anastasio is the chief medicine-man. But he feels that his art is on the wane. The medicines of the missionary, the things purchasable at the store, the prosperity brought by the artesian water, all help to render his services less necessary, so little by little the importance of his functions is disappearing and soon, like so many things of "the old," his office will become a mere name, a thing of the past.

Indian granary

Their native houses are called *kish*, and are built of a framework of strong poles, — mesquite, cottonwood, or willow, — into which are worked in a variety of ways willows, arrow-weed, palm leaves, etc. Sometimes the filling-in material is rudely

woven or wattled; again it is stacked in upright layers held in place by crosspieces, one inside and one outside the *kish*, tied to the upright poles, and fastened to each other by buckskin or yucca fiber thongs. In two *kishes* that I saw there was a success-

Brush shelter

Evolution of Indian dwellings

ful attempt at beautification by tying small bunches of willow or arrow-weed together and then placing the bunches side by side, and fastening them in place by the crosspieces as before described. The tying of the weeds together makes a marked improvement in the appearance of the dwelling.

Willow huts

Evolution of Indian dwellings

As is found in most aboriginal dwellings in the hot Southwest, the desert *kish* is provided with a rude porch, called *al'-a-nut*. This is generally large enough to be a valuable acquisition to the *kish*. It is often larger than the hut proper, and serves as a place

for working, cooking, eating, social intercourse, and indeed, winter and summer alike, for every purpose except sleeping and storing goods.

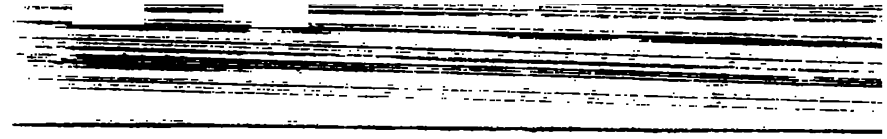
It is a rude, primitive affair, a mere shelter, open on three sides, supported by poles and covered with arrow-weed, willows, or palm leaves, and, during the few scant rains, made as waterproof as is necessary by throwing on a few loads of earth which the palm leaves do not allow to sift through. Here and there a white man's tent, *kar'-pa*, is seen, and one family lives in an adobe house with a most pretentious adobe chimney, while the captain, Poncho Lomas, lives in a composite dwelling, the kitchen being of lumber, and the sleeping-rooms the ordinary willow *kish* of the aborigine.

In one style of house the arrow-weed is used with good effect and picturesque appearance. Small bunches of the weed are fastened by a cross-pole to the upper portion of the house frame. The butts of the weed are upward, and the tips downward. These are then plaited together in neat and regular fashion, new weeds being introduced as required, until the whole side of the house is completed. Here, then, is a house of basketry. It keeps out the sun and rain, and breaks very materially the force of the wind.

Who knows what fetiches are hidden in the shadowy recesses of these dwellings, — the charms to keep off the witches, to prevent the bats flying into the rude houses and sucking away the breath of the sleeping inmates at night, to keep lizards and horned toads from creeping into one's belly and giving terrible cramps, to keep the Evil One out of the stomachs of pot-bellied children at corn and melon time, to keep the rattlesnakes from biting, bears from hugging, mountain lions from leaping upon one, to ward off sidewinders, and the harm that comes from the hoot of the owl at night? What a *mélange* of charms and amulets one would need to give one a good husband or wife, to procure long life, to determine the sex of the unborn child, to make the barren woman bear, to produce a flow of milk, to make the sheep and cows more prolific and add to the number of the horses, mules, and burros, to make the corn, melons, and onions grow, to give one a sweet voice, to win the love of a shy and timid maiden, or to compel the caresses of a wilful and strong-minded man, —

Photo. by C. C. Pierce & Co., Los Angeles, Cal.

COAHUILLA INDIAN AND GRANARY



ah, only those who know the real inner heart, the real superstitious life of the Indian, can dream of the number of these strange things hidden in a village like this.

The Coahuilla Indians do not have many native arts now left to them. They still make a few baskets, however, their work being of fair quality. A few weavers do excellent work. In all there are now thirteen women who do basket-making with some degree of regularity. Careful inquiry among them has so far failed to find any weavers who use any symbolism in the designs of their baskets. One or two weavers imitate birds, reptiles, etc., such designs as those of the eagle, turtle, lizard, and butterfly being not uncommon, but many other designs of evident vegetable origin are said to have no meaning, and are used merely "to make the basket look pretty."

A Coahuilla squaw

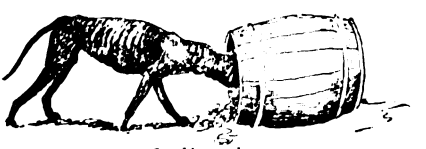
The Coahuillas make a rude pottery in somewhat similar fashion to that of the pueblo tribes of Arizona and New Mexico. They find the clay in the mountains, soak it, and then pound and puddle it with round rocks. As soon as it is properly worked, the pottery-maker takes a piece of the clay, rolls it out into a long rope, and then begins her coil just as if she were making a basket. One coil is laid upon another, and the two are pinched together, then smoothed out with a small bone, wood, or gourd-shell paddle. When the vessel is complete it is dried in the sun for a short time and then put in a fire of mesquite wood. Burning is a difficult process, and requires watching closely. Sand is thrown upon the fire when it seems to burn too rapidly.

While the morality of the Martinez Indians is good, there are cases that arise occasionally that require considerable care in the handling. For instance, the alcalde of 1905 had a family of six children. In addition he cared for his father and mother. Near the end of the year the husband of his oldest daughter died, leaving her with four children. This daughter and her

children came home, thus making in all a family of twelve for the alcalde to care for. His second daughter was about twelve years of age, not yet having come to puberty. She felt the burden her father was bearing, and when a young man of some eighteen years offered her a home, she accepted it, and went to live with him. Her father could not persuade her to return and he went to see the missionary about it, who at once communicated with the Indian agent, and also his own superintendent whose word has great power with most of the Indians of this reservation. Immediately letters were received from the agent and superintendent, the former demanding the immediate return of the girl to her home, and the other suggesting the same thing. Though very angry, the young man deemed discretion the better part of valor, especially as he was informed that if he were patient for a couple of years, and the girl then wished to marry him, all objections would cease.

Indian dogs

Tattooing used to be universal among them. The thorn of the mesquite tree was used to make the puncture, after which the bruised leaves of the same tree were rubbed into the holes until the juice soaked in. Then the juice of the leaf was forced into the flesh by making the puncture deeper. The color thus produced was a very deep green. A few of the older men and women are still found bearing the tattoo. Others have removed it. They inform me that the marks are effaced by repricking them and letting out the blood. As soon as the pricks heal the color disappears.

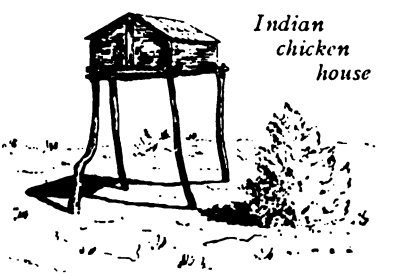


Indian dog

A study of the native plants, grasses, seeds, roots, and fruits used by the Indians as food and medicine is most interesting, and Dr. D. P. Barrows has gone over the ground in a fairly exhaustive manner in his "Ethno-Botany of the Coahuilla Indians." Here are a few additional facts.

One of the chief plants used for medicine is the *metch-o-wol.* Its leaves are supposed to be efficacious in curing sore throat, and an infusion from its root is considered good for a cold. The leaves are taken and well soaked in a pan of boiling water. Then the patient kneels down with his head over the pan containing the infusion. A blanket is thrown over the head and then a red-hot rock is dropped into the liquor. The steam is thus breathed in through the mouth and nostrils and the sore throat soon disappears.

The root is cut into pieces about the size of a lima bean, and then boiled for twenty minutes to an hour. The patient drinks a spoonful or so of the infusion every hour. While the older people still believe in the efficacy of these medicines, the young ones are unanimous in pronouncing them "no good."



Indian chicken house

In the same category of uselessness they place the sweat-bath of the elders. This is taken not oftener than once a month, and never by the young. A small hut is kept for the purpose. It is a rude frame covered with mesquite bark, fan-palm leaves, mud, etc., to make it retain the heat. In the center a fire is lit and when the heat is intense two or three persons in a nude condition sit down around the fire until they perspire freely. When they come out they wrap themselves up in blankets and lie in the hot sun, still sweating, and when by and by the sweating ceases and the body is dry they wash themselves off with hot water. For soap they use the leaves of a plant called *seh'-wel,* which, when bruised and rubbed in hot water, produces a fine lather. In washing clothes the *sehwel* leaves are not only rich in saponaceous qualities, but they help whiten them, having an effect somewhat similar to that of bluing.

With these Indians, as with us, medicine and medicine-men alike often fail to heal, and death ensues. They bury their dead after a ceremonial of wailing that is as piteous as it is pathetic.

The wail of mourners on the desert seems to have greater potency than elsewhere. Shrill and loud, it seems to pierce the stars and reach to the far-away edges of the wilderness, striking the mountain slopes with its wild frenzy and falling back in slightly diminished power to echo and reëcho among the cliffs and up the canyons. The Indian wailing for her dead! It is the articulate voice of sorrow of the ages, the cry of the aborigine against the unbearable hand of Fate.

While there is little or no music in the conventional wailing of the Indians, there are times, both of sorrow and of rejoicing, when they indulge in their primitive music. At such times I feel as if I were being taken back to the very beginning of the world. These simple and primitive songs bring before me

Indian horses

Abraham and Isaac and Jacob and Noah and all the Hebrew patriarchs. I can imagine such songs being sung when the flood came, and when the ark finally settled on Mount Ararat and the family of Noah came out of the ark. It is a wonderful thing to hear primitive music, sung in primitive fashion, by a primitive people when they imagine themselves alone.

The mesquite bean, *men'-a-kish*, and screw bean, *queen'-yl*, are two of their chief articles of diet. The granary in which their supply is stored is made of willow and arrow-weed and is called *pen'-a-vat*. These granaries are three and four feet in diameter, and are generally made by the men. They stand about two and one-half to three feet in height and are placed on platforms, in order that predatory animals and vermin may not get to their contents.

To make a food or drink of the beans they are pounded in a wooden mortar, generally made from the trunk of a tree, hollowed out as far as needed with a stone axe. As soon as the beans are pounded into meal, this is sifted through a basket screen. The flour is then put into a basket or pail and water sprinkled over it, where it remains for two or three days. By this time it is hard and ready to eat.

For drink the flour is soaked a few minutes, the liquor, *ka'-hat*, is then poured off and drank. It is never allowed to ferment.

For candy, *pah'-vas-ni-at'*, the flour is especially chosen from well-ripened beans and ground exceedingly fine. It is made the same as the bread.

In preparing barley for food they dampen it a little, pound it in a mortar, and then, placing it in a saucer-shaped basket, shake the basket and toss the barley up and down with a peculiar circular motion. Soon the hulls are edged off and drop to the ground, while the grain is gathered together toward the operator. It is an interesting process, for the dexterity of movement is remarkable.

It is only within comparatively recent times that we have learned of the rich treasure-house of legend, myth, and story the Indians' memory is. These stories have been handed down from the "old times," and reveal the mental processes of the Indian as nothing else can.

Captain Poncho gave me the following Coahuilla story of the advent of man and of the creation of the earth: "In the long, long ago, before the world was created, there was nothing but darkness and lightning. For a long period of time it would be all dark, and then suddenly, with flash and zigzag, the fierce brilliancy of the lightning would strike through the darkness. Once these flashes and zigzags struck so often that they formed an egg, which grew bigger and bigger until it was fully as large around as a big man is tall. There were two babies in that egg. There was nothing to hold up the egg but the air, yet it floated until the babies grew bigger and bigger, so that they knew things. When they were old enough to know things they thought they would break their shell and come out, and one of them did so. As soon as he broke his half of the shell and

emerged, he exclaimed, 'I'm the oldest!' The other said, 'No! I'm the oldest! But if you are older than I, go ahead and make something for us to stand on. We can't float around here in this rotten egg-shell forever and by and by it will give way and we shall sink and sink until we go nowhere and that will be the end of us.'

"'I shall not obey you,' said the first one to emerge. 'You are younger than I, so you must do what I tell you!'

"'No! You are the one to do it because you claim to be older than I. You make something to stand on. The fact is, you can't make anything!'

"This taunt angered the older one, so he exclaimed, 'You think I cannot make anything. I will make the earth;' and he at once proceeded to make the earth and the people to live upon

Corral at Martinez

it. But there was no sun and no moon and everything was dark and the people cried for light. So the older said to the younger, 'Make some light for the people to see by,' and the younger one made the stars. But that was not enough. They gave but little light and the people cried out for more light. Then the older one said to the younger, 'Your light is not enough. Make more.' So in obedience the younger made the moon. But there was still not enough light, and when the people complained the older said to the younger for the third time, 'Make more light!' This time, however, the younger brother refused. He said, 'I have made all the light there is, and I do not intend to make any more. You command me to make the light because you don't know how to make it yourself.' This taunt made the elder brother fiercely angry and he cried out, 'Do I not know? Look!' And with a swift stroke of anger he created the sun, which has ever since made light for the whole world.

"The younger one recognized his brother's power, but consoled himself by saying as he walked away, 'Well, he would never have made such a great light as the sun, unless I had first showed him the way.'"

In the early days the Martinez Indians used to have a fire-dance. A few of the medicine-men made a large bonfire, around which they danced in an almost naked condition, singing the while their songs and incantations. When the flames died down and only the bed of incandescent coals was left they walked right into the center of the hot mass and remained there for several minutes, suffering neither injury nor inconvenience therefrom.

Watering place at Torres

But this power seems now to be lost. There are but two old medicine-men, Ignacio Ormega and Juan Pedro, and the extent of their fire charms consists merely in taking live coals into their mouths and then breathing out flames and smoke. Occasionally a fire-dance is now given, but as both the priest and the pastor of the Moravian mission are opposed to it, and most of the people attend one church or the other, the dance has fallen into disrepute and will undoubtedly soon disappear.

On the map, to the southwest of Mecca, will be noticed the name Fig Tree John's. This is the home of an Indian who receives his name from the fact that he has a number of fig trees planted around the springs upon which he has been located for many years. The water has demonstrated the rich fertility of the soil and his trees have grown until they are large and bear well. Thirty of his trees are fully thirty years old, and he has a smaller

orchard of younger trees. He claims to have started the orchard himself from the cuttings of a tree which he found at some deserted settlement. His figs are among the finest and earliest in Southern California, and are about the size and shape of a turkey's egg. They ripen early in May, and in the Los Angeles market they bring about twenty-five cents a pound. The figs on my own trees at Pasadena this year, 1906, did not ripen until the middle of August, so that the advantage of Fig Tree John's early shipments will be evident.

CHAPTER XVI

The Stage Line Across the Desert

RESISTLESSLY progress marches in every new country where the Anglo-Saxon sets his foot. The Army of the West crossed the Colorado River from Yuma to San Diego in 1846 to find California already enrolled under the United States flag; the battle of San Pasqual was fought December 6 and 7, 1846; P. St. George Cooke, with the Mormon Battalion, came through a month later (in January, 1847) and gave his name to Cookes Wells; gold was discovered next year, January 24, and by the end of 1848 the world's gaze was turned to the new Eldorado. In 1849 the real exodus began, and, as Sonora was nearer to California than any other well-peopled country, the Sonoranian emigration was the first in the field. For three-quarters of a century California had held direct intercourse—more or less frequent—with Sonora and the route was fairly well known, by way of Tubac, Tucson, the Gila Valley, across the Colorado River and the Colorado Desert, either to the mission of San Diego, over the lower road, or to the mission of San Luis Rey, through the San Felipe Pass, while a third road went up by Indio and Palm Springs, over the San Gorgonio Pass, to mission San Gabriel.

From 1850 to 1853, J. R. Bartlett was engaged in determining the boundary line between Mexico and the United States, and he fully describes the route from San Diego to Yuma by way of San Pasqual, Warner's Ranch, and San Felipe, thence by Cameron Lake to the Colorado River.

In September, 1853, Arizona was purchased from Mexico, under the Gadsden treaty; in 1853–54, Jefferson Davis, then Secretary of State, ordered a survey of the country west of the Mississippi in order to find the best railroad route to the Pacific,

and in accordance with his instructions Lieutenant Williamson and his aids made surveys of the country from Los Angeles south to San Diego and from both points to Yuma, thus covering the southern and the San Gorgonio Pass routes over the Colorado Desert.

In 1854–55 the new boundary survey was made, including Arizona, by Major Emory and Lieutenant Michler, and when Arizona mines began to be developed, as they did about this time, the slow methods of wagon transportation were found inadequate to meet the needs.

During the whole of this period immigration travel was desultory and irregular, people coming in with their own wagons and generally returning by the Isthmus.

An early-day stage-coach

In August and September, 1857, the San Diego and San Antonio semimonthly stage line was established, under the direction of I. C. Woods. James Burch was contractor. This continued in spite of the bad habit contracted by the Indians of personally undertaking to distribute not only the mails, but the dead bodies of the mail carriers, the mail coaches, and the stock, over the plains, and the occasional playful acts of impaling the station keepers with arrows and spears, and burning the stage stations.

But the pressure upon Congress now was so great for a regular mail service to California that one of the last acts of the Congress sitting at the termination of the Pierce administration was to

authorize the Postmaster-General to establish a postal route between the Mississippi River and San Francisco, California, for a period of six years. Advertisements were published asking for bids, but limiting the amounts to not more than $300,000 per year for semimonthly, $450,000 for weekly, or $600,000 for semiweekly service. The bids were opened on the first of July, 1857. There were nine bids in all. It was decided not to use the northern routes, as the Post-office Department already had had large and distressing experiences on those routes owing to snows. As for instance, the mails for November, 1850, by way of Salt Lake, did not reach their California destination until March, 1851, owing to the unprecedented falls of snow in the Sierras that winter.

On the second of July, 1857, the Postmaster-General accepted the bid and made the order for the route "from St. Louis, Missouri, and from Memphis, Tennessee, converging at Little Rock, Arkansas; thence via Preston, Texas, or as nearly as may be found advisable, to the best point of crossing the Rio Grande above El Paso, and not far from Fort Fillmore; thence along the new road being opened and constructed under the direction of the Secretary of the Interior, to Fort Yuma, California; thence through the best passes and along the best valleys for safe and expeditious staging, to San Francisco."

It took a year to get the line in operation and on September 15, 1858, the overland letter mail, in four and six horse and mule coaches, left St. Louis and San Francisco simultaneously on their long trip across the country. The schedule time was twenty-five days, three days less than that of the ocean route by way of Panama.

The line was finely equipped, there being over 100 specially constructed Concord coaches, 1,000 horses, 500 mules, and 750 men, of whom about 150 were employed as drivers.

The fare was $100 in gold for each passenger, whether he were a Tom Thumb, a Falstaff, or a Daniel Lambert. Six passengers went through from San Francisco to St. Louis on the first stage, and their arrival at St. Louis was considered a great public occasion. In San Francisco the rejoicing was on a gigantic scale. The long-hoped-for, dreamed-of, and desired

overland mail was now a reality and the pioneers showed their joy and appreciation in a great round of festivities.

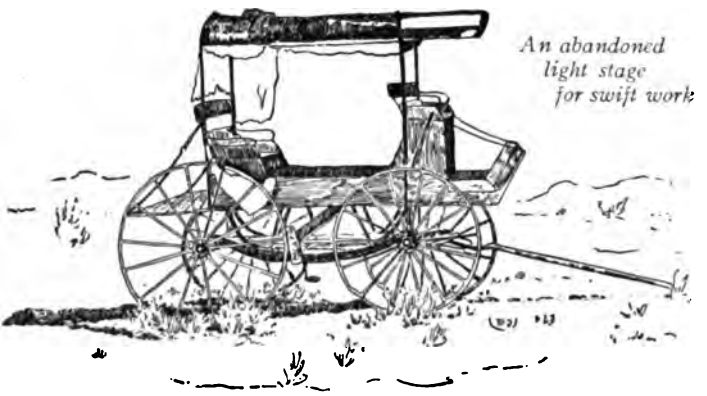
The line was known as the "Butterfield Overland Mail."

It was the longest continuous line ever organized and the best operated. It ran twice a week, under a six years' contract with the Postmaster-General, at a subsidy of $600,000 per year. Considering the difficulties, it was one of the most wonderful private enterprises of history. To span the continent, and in so doing ford treacherous rivers where changing quicksands made every trip dangerous, and floods often carried away horses, coaches, and drivers; traverse barren, sandy deserts where water and feed had to be provided for both man and beast, and where moving sand-hills, heat, and storm often rendered travel impossible; cross towering mountains where, in winter, deep snows buried roads twenty, fifty, and even a hundred feet out of sight; through marshy quagmires where miles of road had to be constructed of corduroy; through dense forests where wild animals lurked; and where, from one end to the other, the sole reliance was upon the grit and nerve of man and the endurance of horse-flesh; in spite of a score of hostile tribes, all of whom seemed to concentrate their efforts to stop this new movement of their white foe, — I say to span the continent, a distance of nearly two thousand five hundred miles, in twenty-four and, later, twenty-one days, was a feat of which man might well be proud. That it ran well is evidenced by the fact that the Los Angeles *Star* records that it came in ahead of time, and had flaming head-lines calling for "A Hundred Guns for the Overland Mail, Twenty Days from St. Louis." But as J. M. Guinn says: "The sleepy old city could not keep awake. The next issue of the *Star* says: 'The Overland Mail arrived at midnight. There was no one in the post-office to receive it, and it was carried on to San Francisco,' to be returned six days later, with all the freshness of the news gone." The route from Los Angeles was by El Monte, Temecula, Warner's Ranch, Vallecita, and Alamo Mocho to Yuma.

The roads over which the stages traveled were all natural. There were no "made" roads, save in a few isolated places over steep grades, or where a marsh had to be "corduroyed."

And it is the same on the desert to-day. As soon as a road becomes too deeply rutted or too muddy, the driver strikes out and makes a new road for himself, and the result is some regions are cut up with diverse roads all made during a period, say, of wet weather to avoid too much mud, or some peculiarly bad place.

While the Butterfield line was in successful operation, running its biweekly stages, a monthly mail line was plying between St. Louis and Salt Lake, and it was soon to become the main line and the forerunner of the first overland railway. Trouble with the South was pending and finally the Civil War broke



An abandoned light stage for swift work

out. Almost immediately the Butterfield line went out of commission.

The Confederates levied on all the stock, etc., on the east end of the line, and the Apaches and other Indians, who had been making constant endeavors to drive the stage-coach line out of the country, seeing the change in affairs, even though they did not understand the cause, seized the opportunity and stole all the stock and furnishings, burnt and pillaged the stations and as far as possible wiped out every vestige of the Overland Mail at the western end.

On the twelfth of March, 1861, the southern overland route was ordered discontinued and a bonus of one month's extra pay given to the contractors. St. Joseph, Missouri, was selected as the

starting point for the new line, and it operated as the "Central Overland California and Pike's Peak Express" (abbreviated to C. O. C. & P. P.), via Atchison, Kansas, Salt Lake City, and Placerville, California. July 1, 1861, it went into operation as a *daily* line, and thenceforth the southern line was practically abandoned. For in 1863, when J. Ross Browne was invited by Charles D. Poston, the first Indian agent for Arizona, to go from Oakland with him on a trip through Arizona, they had to rely upon personal conveyances, though the government supplied an escort of five soldiers and an officer, as well as mules for the ambulance and rations for the soldiers.

At the close of the war, when matters were more settled, a freight and passenger service was organized by the Hooper-Whiting Company of Yuma. Vessels plied between San Francisco and other California points, and sailed into the Gulf of California and thence up the Colorado River to Yuma. For many years the main bulk of supplies for the Arizona miners and those located on the river above Yuma came this way and stage service on the southerly route, by Warner's Ranch, was desultory and finally abandoned.

In 1872 the stage from Prescott to Los Angeles came by way of Ehrenberg, Chuckwalla, Indio, Palm Springs, and the San Gorgonio Pass. P. W. Dooner, who came to Los Angeles in hat year by stage, tells of his first stop on the desert at Chuckwalla. This was then, says he, "a station where refreshments and lodging are supposed to be furnished. The place was just about as classic in its surroundings as the jingle of its name would suggest. We came upon the scene at a moment when all the indications pointed to a recent domestic calamity. We were informed by the driver that the occupant was blessed by an Indian wife, taken according to Indian rites, and that unhappy differences of opinion had agitated the domestic hearth within the period of twenty-four hours which had deprived the establishment of its mistress, and which would materially affect the accommodations of the place. A notice which had just been posted in a conspicuous place upon the outer front wall of the family hut gave the only other information that we could gather concerning the family trouble. This was scrawled in plain but

uncouth letters — Roman and script intermixed — and was carefully copied into my diary. It reads as follows:

"'NOTICE: — An oldish squaw about 30; blind in one eye — the left one; a slight halt in one leg; a thoroughbred. She has abandoned the ranch, and any one who will get her back will receive two sacks of mesquite beans.'

"We were detained here for some four hours, and up to the time of our departure no person had come to claim the proffered reward.

"From Chuckwalla westward was the usual desert journey, undisturbed by incident, but still an experience that must have been undergone in order to be appreciated. No words can convey an adequate conception of the desolation of the mid-desert region. The stillness and silence are unbroken by any motion

Later-day stage-coach

or sound except it be the vibration of the palpitating air under the torrid heat, or the voice of the driver as he urges the weary mules to renewed exertion. In one direction the view is swallowed up in the mirage, or exhausts itself over an endless expanse of sand, and in the opposite direction a reddish brown sandstone bluff rims the horizon. Of indigenous life there is none at all — nothing but sky and sand and sweltering heat. One might reasonably suppose that the twilight hour would bring some relief from the oppressive heat, but, while the temperature of the night may have been much lower than that of the day, there was always some compensating influence in the atmosphere of the night that made such change hardly, if at all, perceptible. The night breeze, if such there happened to be, was invariably so warm as to make it much more comfortable to screen the face from its contact than to invite exposure to its

biting influence; while, in a calm, the constant radiation of heat from the burning sands of the preceding hours of day maintained the atmosphere at a temperature always above the normal heat of the body."

As is recounted in other chapters the old stage stations of the desert still stand, some in ruins and deserted, others used as ranch-houses or present-day stopping places for miners and prospectors. Many are the stories that travelers tell as to what occurred in the old days at these stations.

A lady friend of mine, the wife of a former U. S. Army officer, once took the journey from San Francisco to Tucson. She well remembers stopping at one of the stations on the Colorado

Modern visitors on the desert

Desert after the Indians had made a raid and cleaned out the commissary department. The meal had to be cooked and served by the station-keeper, and as he came to the table with a battered, grimy, and unclean looking coffee-pot, and stood at her elbow, he asked, "Will yer have coffee, tea, cocoa, chocolate, or milk?" Then apparently as an afterthought he exclaimed, "Yer'll have to take coffee, damit, for that's all there is."

Mr. J. L. Vosburgh, of Los Angeles, came from St. Louis, Missouri, to Los Angeles, California, on the Butterfield stages. Said he in a recent conversation: "Those were strenuous days for travelers as compared with the ease of Pullman travel to-day, but all hardships and inconveniences were taken, as a rule, in the spirit of fun. We looked upon them as fit subjects for jokes, and the

travelers who complained and whined were generally either guyed unmercifully, scored by the driver, or left severely alone. I well remember stopping at one station, the keeper of which shall be nameless. We found him in an awfully disagreeable mood. The stage-driver 'jollied' him a good deal, without removing the dark pall of gloom and moroseness that had settled on his countenance. He had warned us beforehand to look out for 'fun' when he mentioned 'cats.' Accordingly when he asked, 'How's your cats? All gone?' and received no reply, and then turned to us, and, with a merry twinkle in his eyes, assured us that 'H—— shoots all the cats he can find and serves them up to poor hungry travelers as rabbits,' we were all alert for something, we hardly knew what. But we were not prepared to see H—— reach for his revolver, and with a curse for his tormentor seek to shoot, which he certainly would have done, had not I, who happened to be nearest to him, taken the revolver from him. It afterwards transpired that the poor fellow's daughter had that day run away with a Texan without saying, 'By your leave,' or 'Give me your blessing,' and he was in no joking humor."

Mr. Vosburgh then told of another trip he made from Yuma over the sandy wastes where he saw the heads and horns of a large number of cattle sticking out of the drifted sand. A cattleman had started with a band of six hundred fine steers for the Los Angeles market from Southern Texas. It was a long, hot drive to Yuma, but having reached the Colorado River and crossed it in safety, though his animals were very weary, their owner had begun to congratulate himself that the worst part of the journey was over. A few days later he was able to tell another story. The desert had tried the poor creatures fearfully and they were compelled to camp one evening without water. The herders comforted themselves with the assurances that they had received that they would be able to water before noon the next day, and themselves stretched out to rest, as the extreme exhaustion of the wearied cattle satisfied them that there was little fear of a runaway or stampede that night. During the late hours a sand-storm arose of such dreadful fury that every effort of the cowboys to compel the herd to get up and resume

the march was in vain. The poor creatures, too tired to battle against the drifting sand, allowed it to rise around them, and when at last they themselves seemed to realize that they must make an effort to extricate themselves or they would perish, it was too late, and when morning dawned it found the cattleman ruined, his herd all dead or dying, and a mass of shapeless forms with here and there a protruding head or pair of horns, all that remained to tell of what, the day before, had seemed to be enough to bring him in a small fortune.

Old stage-station at Vallecito

CHAPTER XVII

Water on the Desert

NOTHING is more precious to either the desert denizen or the desert traveler than water. There is no wonder that the desert tribes have symbols that they constantly and persistently force upon the attention of their gods which tell of their love for and need of water. "Give us water, more water," is the motive of these inarticulate prayers. They weave the zigzag of the lightning into their blankets and baskets, paint it upon their leather ornaments and articles of dress and upon their bodies, sprinkle it with different colored sands upon their sacred altars and sing, dance, and pray to the gods controlling the "fire connected with rain"—the lightning—that they may be propitiated to aid in sending the needed water. They weave rainbows in their baskets and sprinkle the sacred meal before the altars of the rainbow gods in rainbow shape in order that the sky may again be arched by this beautiful sign. They cherish the snake as the guardian of the springs and watercourses, for is he not always found where water is? and is not his winding, sinuous course a living type of the winding, sinuous course of the streams? They paint the snake on their girdles, weave him into their blankets, mold and shape him in silver into rings and bracelets for fingers and wrists, carve his effigy out of stone, and represent him by numerous hieroglyphics upon the cliffs and cave-walls of their dwelling-places and camps. They have their snake dances, which are solemn prayers for rain, and their flute dances, which are petitions that the springs may be filled up, and their rain dances and songs, which have the same objects in view.

The Indians of the Colorado Desert not only discovered and

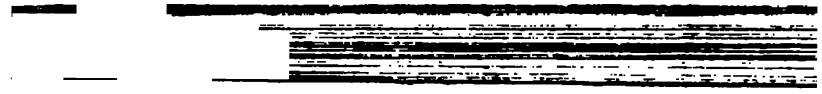
located all the hot and cold springs, but they also did what no other North American tribe has been known to do. John Fiske plainly states that none of them, of whatever grade, ever used either pump or well. The Coahuillas, however, long before the advent of the white man, dug wells on this desert. Indeed they might be differentiated from other tribes by being called "well-diggers," as the whole of the Coachella Valley is dotted over with their wells. Some of these are fully twenty-five to thirty feet deep. The nearer one gets to the Salton Sea, however, the closer is water found

An ancient Indian well

to the surface. The very existence of the Coahuillas upon the desert depended upon their ability as well-diggers. Their name for the wells is *te'ma-ka'-wo-mal-em*, signifying "water-jar in the earth," *temal* meaning earth or ground, and *kawomal*, water-jar. These wells were usually great pits with terraced sides leading down to the narrow hole at the bottom, where the woman could step to the water's edge and there fill her *olla*. In some cases the well was dug as white men would dig it, with an inclined plane sloping to the pool from the upper level. In one of Mr. Eytel's drawings a well will be seen where the

Copyright, 1903, C. C. Pierce & Co., Los Angeles, Cal.

IN THOUSAND PALM CANYON, COLORADO DESERT



terraces are still quite distinct. Since other water supply has been found, many of these wells have become more or less choked up with sand and earth, though quite a number are still in use away from the mountain streams and the artesian flows.

Blake describes (1853) the Indians clustered around the hot spring at Palm Valley, and then tells of the deep well, twelve miles southeast, where his party camped on the following day: "It was at the base of a high sand-drift, and about twenty-five feet deep, but contained only a little water. It was wide at the top, but became smaller towards the bottom, being a funnel-shaped depression. The water was obtained by means of steps cut in the sides of the pit, the clay having hardened by drying so as to become like stone. This excavation appeared to have been made by the *hands* of Indians, for there were no marks of implements, and the clay that had been removed appeared to have been taken out while very moist and plastic. The opening to the well was shaded by several mesquite trees."

Ever since the advent of the white man there has been conflict between him and the Indian for the possession of the springs, water-pockets, and streams on the desert. Outrages innumerable, violence incalculable, hatred immeasurable, murders unnumbered have been the result of this conflict, — all owing to the scarcity of this precious fluid. Nor has war between red and white alone been an evidence of water's preciousness. White men have cursed, maimed, wounded, and slain each other times without count on the deserts of our Southwest because water was scarce. Not a few have located on the only source of supply in a particularly barren, desolate, desert region, and by force have collected large toll of the unfortunate beings whose journeyings led them over this inhospitable road. Men have been found, knife and gun in hand, slain in a desperate conflict for possession of this precious supply.

Early day travelers and prospectors on the desert were entirely dependent either upon the favor of Indians or their own skill to discover water-holes, "seeps," or springs. The history of the tragedies of those days has never been written and never will be, for no man knoweth how many lives were lost in the eager search for wealth prior to and succeeding the great gold

discovery of '49. In later years men have banded together a little more. There has been a kind of freemasonry among prospectors. They have told each other where water was to be found. Occasionally a man would find himself in a region which promised well and he would clean out a good sized "tank," or even dig a well, if the water seemed to be near the surface. But not until recently have the officials of the counties made any endeavor to provide water, even on the roads more often traveled. On the county road going north from Mecca to the Mohave Desert country, twelve miles out is a well which bears the name of Shaver, he being the county commissioner under whose direction it was dug.

At Cottonwood, some miles farther on, is a good spring or seep, which the owners of the Iron Chief Mine have gone to considerable expense to conserve. They have built two stone and cement reservoirs, piped the water into troughs in large feed corrals, and also erected a pumping plant to force the water to their mine some twenty-five to twenty-eight miles away.

Our canteens

Four miles southwest from Cottonwood is Palm Tree Canyon, where "Charley" Anschultz has his mining prospects.[1] Here there is a fair supply of water which makes his work possible. Without the water he would either have to abandon his mining endeavors or "pack" water over the trail from Cottonwood springs.

Knowledge of the few water-holes, springs, and wells on the desert is essential to the prospector, hence it is singular, to say the least, that no more definite effort has been made by the desert county officials to make these locations better known.

As I show in a later chapter on Sign-boards on the Desert, George W. Parsons, of the Mining Committee of the Los Angeles

[1] Since the above was written this well-known desert prospector and miner has come to an untimely end. Two men and a woman stole two horses from Mecca on Sunday night, September 9, one of which belonged to Anschultz. The next morning he followed the thieves, alone, and indications show that he was ambushed and murdered when he came up to them.

Chamber of Commerce, has been agitating a concerted movement to this end for some years. The desert wells should be cleaned out, covered so that animals will not fall in and drown, and buckets and ropes provided to reach the water. Then signs should be erected on all the trails giving explicit instructions how to reach water in every direction. Regular visits should also be made to see that the wells are kept in good order. Riverside leads the state in this regard, and it is to be hoped the good work will continue until the desert wells are as numerous and easily reached as they should be.

But even on the line of the railway, where water can be had every ten to fifteen miles, one should be exceedingly careful about venturing without a full supply.

The reflection of the heat from the sand is so intense that no person, however well used to the desert, should think of going unprovided for more than two or three miles. Men have started off, in perfect derision of kind cautions, to walk along the railway track. The idea that any man could not walk from one station to another on a railway track without water was too preposterous for them to consider. Yet in the years since the railway was completed in 1881 it is safe to say fifty men have thus lost their lives.

The most careless observer can scarcely fail to notice that each train, going east or west, over the desert, has its own water-car. Eastward water-cars are put on at Indio and taken as far as Mammoth Tank, and westward bound the engines fill up their tender and then hook on the water-car at Mammoth, dropping it at Indio. Freight and passenger trains alike are thus compelled to draw their own water supply. To remedy this, if possible, three artesian wells were bored, some years ago, at Mortmere (not the present Mortmere, but the one that is now under the waters of the Salton Sea), and a full flow was secured in all cases, the water pouring out in good volume two feet over the casing. But on testing it, it was found to be unsuitable for the use of the locomotives, some mineral or other substance in it producing foaming in the boilers. Hence the railway company was compelled to go back to its old method of hauling water-cars, which it still continues.

In 1899 a successful well was bored by the Southern Pacific Railway Company at Mecca, from which a good flow of pure soft water was obtained. Then the government appropriated $2,500 for the sinking of an artesian well at Martinez, in order to see if something could not be done to change the abject condition of the Indians. It proved to be a wonderful well, and is still flowing constantly. The flow was so abundant that it and the well at Mecca may be said to have given the present life to the Coachella Valley, for without artesian water nine-tenths of the present white inhabitants would be unable to live there. The settlement of the valley dates from the discovery of this belt of artesian water. Immediately all available land was taken up under the homestead and desert land acts, except that which is on the railway grant.

The modern artesian well

There are now nearly three hundred artesian wells in the Coachella Valley. They range generally from 450 to 550 feet deep, though there are some that range between 330 to 650 feet. The cost of boring is about $1.00 per foot, according to the casing used, a four-inch pipe being the regular size. The well at the experimental date farm, at Mecca, is 482 feet deep and yields 35 miner's inches of water.

Surface wells can be dug anywhere in the Coachella Valley and water found at from 50 to 300 feet. In the upper part of the valley, say near Indio, this surface water is of fair quality, but it becomes more alkaline as one goes farther south.

The water that flows from the artesian wells is about 60° Fahrenheit, and is warm enough to promote the growth of the plants to be irrigated, even though it immediately come in contact with them. Too cold water will often retard plant growth.

This water also is "soft," so that for domestic purposes it is

greatly to be desired. To one used to a "hard" water, where soap does not lather freely, this desert water is peculiarly agreeable. It is good to the "feel," and when, as was our case on the desert, we were often compelled to do our own laundrying, it was a great comfort to have cold water that lathered easily and that seemed to second all our untutored attempts to make our soiled garments and belongings clean.

This artesian water doubtless has its origin from the flow of the near-by mountains. These comprise the entire eastern slope of Mount San Jacinto and the southeastern slope of Mount San Gorgonio. For fully five months, from April to August, the White-water River will discharge three thousand inches of water. For the same period from Tauquitch, Chino, Murray, Andreas, and Palm Canyons a flow of nine thousand inches is a reasonable estimate. All these streams disappear within a mile of their debouch on the desert to add to the inexhaustible artesian supply of the valley below.

In and around the artesian wells at Mecca and in the streams leading from them to the Salton Sea are countless thousands of tiny fish, like minnows. Whether these came from the wells or from the Salton I am unable to say.

In arid regions, where the clouds do not furnish rain in sufficient quantities for crops, water for irrigation is as great a desideratum as land. Given the best soil in the world, without water to make it productive it is valueless. Hence in the desert, where all prosperity depends upon the welfare of the farmer, it is to the interest of all to see that the water supply is conserved, is properly distributed and wisely utilized. While at first sight it may not appear relevant, it is nevertheless true that every desert farmer should be personally interested in the forest region from which he directly obtains his water supply. In the case of those who rely upon the Colorado River this is impossible, but as a general proposition the statement holds good. The water supply of the region is well known to have most intimate connection with the state of the forests. Denudation of forest areas is invariably followed by the conversion of constantly flowing streams into dry washes subject to destructive floods. The forests conserve the moisture and act as feeders to the springs, and when they are

removed, the rain, having nothing to hold it, runs off immediately with great force, carrying with it the humus that helps retain the moisture and renders vegetation possible. Thus in two ways the irrigation farmer is injured: first, his water supply is inconstant and uncertain, either a flood or a drought; and, second, a bare country is soon washed and gullied by its floods which thus carry off a large amount of sediment. This silt and sand fill up reservoirs, canals, and ditches, thus causing considerable annoyance and often great expense.

Of the use of artesian and Colorado River water for purposes of irrigation, a subsequent chapter will deal. There is still, however, a vast amount of water running to waste from the San Bernardino and the San Jacinto ranges, which might, and ultimately will be, impounded and then conveyed in pipes or other conduits for the irrigation of the desert. Thousands of acres of fertile land in both the Imperial and Coachella Valleys, far above the present canal levels and above the flow of artesian water, await the magic touch of the vivifying fluid to produce abundantly.

Mexican hauling water at Mexicali

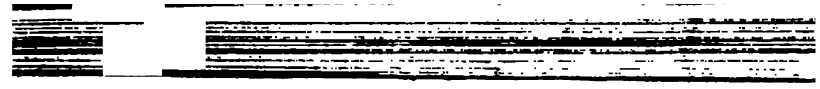
located all the hot and cold springs, but they also did what no other North American tribe has been known to do. John Fiske plainly states that none of them, of whatever grade, ever used either pump or well. The Coahuillas, however, long before the advent of the white man, dug wells on this desert. Indeed they might be differentiated from other tribes by being called "well-diggers," as the whole of the Coachella Valley is dotted over with their wells. Some of these are fully twenty-five to thirty feet deep. The nearer one gets to the Salton Sea, however, the closer is water found

An ancient Indian well

to the surface. The very existence of the Coahuillas upon the desert depended upon their ability as well-diggers. Their name for the wells is *te'ma-ka'-wo-mal-em*, signifying "water-jar in the earth," *temal* meaning earth or ground, and *kawomal*, water-jar. These wells were usually great pits with terraced sides leading down to the narrow hole at the bottom, where the woman could step to the water's edge and there fill her *olla*. In some cases the well was dug as white men would dig it, with an inclined plane sloping to the pool from the upper level. In one of Mr. Eytel's drawings a well will be seen where the

Copyright, 1903, C. C. Pierce & Co., Los Angeles, Cal.

IN THOUSAND PALM CANYON, COLORADO DESERT

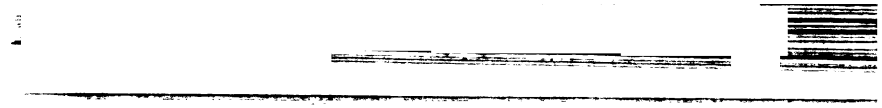


terraces are still quite distinct. Since other water supply has been found, many of these wells have become more or less choked up with sand and earth, though quite a number are still in use away from the mountain streams and the artesian flows.

Blake describes (1853) the Indians clustered around the hot spring at Palm Valley, and then tells of the deep well, twelve miles southeast, where his party camped on the following day: "It was at the base of a high sand-drift, and about twenty-five feet deep, but contained only a little water. It was wide at the top, but became smaller towards the bottom, being a funnel-shaped depression. The water was obtained by means of steps cut in the sides of the pit, the clay having hardened by drying so as to become like stone. This excavation appeared to have been made by the *hands* of Indians, for there were no marks of implements, and the clay that had been removed appeared to have been taken out while very moist and plastic. The opening to the well was shaded by several mesquite trees."

Ever since the advent of the white man there has been conflict between him and the Indian for the possession of the springs, water-pockets, and streams on the desert. Outrages innumerable, violence incalculable, hatred immeasurable, murders unnumbered have been the result of this conflict, — all owing to the scarcity of this precious fluid. Nor has war between red and white alone been an evidence of water's preciousness. White men have cursed, maimed, wounded, and slain each other times without count on the deserts of our Southwest because water was scarce. Not a few have located on the only source of supply in a particularly barren, desolate, desert region, and by force have collected large toll of the unfortunate beings whose journeyings led them over this inhospitable road. Men have been found, knife and gun in hand, slain in a desperate conflict for possession of this precious supply.

Early day travelers and prospectors on the desert were entirely dependent either upon the favor of Indians or their own skill to discover water-holes, "seeps," or springs. The history of the tragedies of those days has never been written and never will be, for no man knoweth how many lives were lost in the eager search for wealth prior to and succeeding the great gold



Stanford University Libraries
3 6105 013 870 089

F
868
I2J3
v.1

Stanford University Libraries
Stanford, California

Return this book on or before date due.

OCT - 8 1975

SPRING 1981